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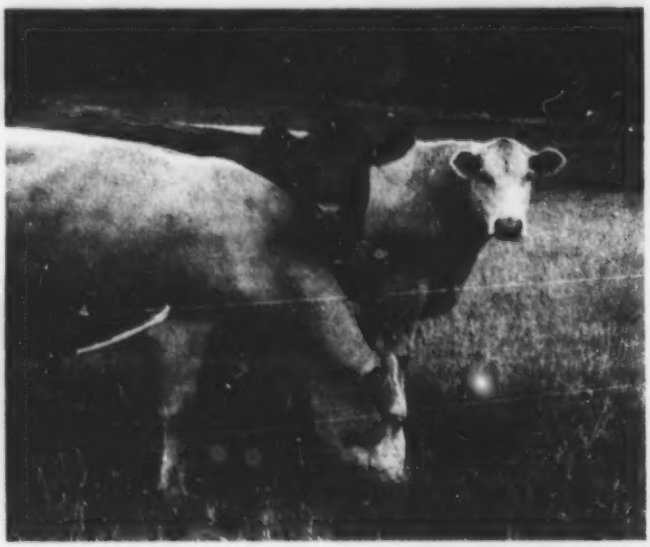
Evaluation Report 752



Baygard 1500
Baygard 2000
BULLDOZER Model C402
Gallagher M800
Gallagher PowerBox B300
PEL 230
Red Snap'r LI30
Red Snap'r LIB30
Stafix M3.2
Stinger Plus AC
Stinger Plus DC
Stockman Model 6000

Electric Fence Controllers

A Co-operative Program Between:

Prairie Agricultural Machinery Institute

Agricultural Technology Centre

Saskatchewan
Beef Development Fund

Introduction to Report

PAMI conducted this evaluation project with technical and financial support from the Agricultural Technology Centre (AgTech Centre) and the Saskatchewan Beef Development Fund (BDF). The purpose of this project was to perform engineering testing of electric fence controllers in controlled conditions to produce results that would allow the farmer/rancher to make direct comparisons between the controllers. This report briefly describes the characteristics of electric fences, but the building and maintaining of electric fences has not been included. For more information on those areas, extension papers are available from Saskatchewan Agriculture and Food, Manitoba Agriculture and Food, and Alberta Agriculture, Food and Rural Development.

Operating Conditions

The operating conditions for an electric fence controller operating in the field are extremely variable. These operating conditions are dependent on many factors such as fence length, weather, vegetation, and fence insulation. To standardize and control these variables, PAMI tested electric fence controllers in the lab using combinations of resistors and capacitors to simulate specific operating conditions. Measurements in all cases were taken at the electric fence controller's output terminals.

The resistance of a particular fence can greatly influence the fence controller's output. Resistance, measured in ohms (Ω), varies with fence length and operating conditions. The operating conditions have the largest effect on resistance. These operating conditions include vegetation contacting the wire, fence insulation, and weather. Weather affects both the air humidity and ground moisture conditions, wet or dry. PAMI simulated a range of operating conditions, as shown in **Table 1**, by using different resistance values during the lab tests.

Capacitance, measured in microfarads (μF), is another variable affecting fence controller output. The number of fence wires and their spacing, the wire gauge, the height of the wire above the ground, and the overall length of the fence affect the capacitance of a particular fence. However, capacitance is largely dependent on fence length. PAMI simulated two lengths of single-wire fence, 3.3 and 10 mile (5.4 and 16 km), by using two different capacitance values during the lab tests.

An uninsulated fence with wet grass touching the wire has a low resistance. In this condition most of the fence controller's output shorts to ground, and the shock to the animal is reduced. If the fence is well insulated with no grass touching the wire, almost all of the controller's output is used to shock the animal, and the shock is maximized.

Cold temperatures can also affect performance of some fence controllers, so PAMI also tested the fence controllers at reduced temperatures to ensure proper winter operation.

Shock Delivery

To deliver a shock, an electric fence controller must maintain adequate voltage to overcome the insulation resistance of the hide and hair of the animal and of the ground return path. This is called guard voltage. The minimum guard voltage has been defined as 700 volts (V) for short-haired animals, such as dairy cows, and 2,000 V for long-haired animals, such as beef cows. The minimum guard voltages of 700 V and 2,000 V have been traditionally used in the industry. If the guard voltage supplied by the electric fence controller is above the specified minimum, the animal will receive a shock. If the guard voltage is below the minimum, no shock will be felt. It is important to realize that guard voltage only determines whether or not a shock will be delivered to the animal and is not a measure of how much shock will be felt.

Shock Intensity

If the guard voltage is adequate to deliver a shock, the effectiveness of the fence will then depend on how much shock is produced (shock intensity). Rating the shock intensity of an electric fence controller is difficult due to the different physiological effects of shock pulses on animals. As indicators of shock intensity, PAMI reports both the peak current and the electrical energy outputs delivered by the fence controller. These are both dependent on the operating conditions and the fence controller's ability to produce a shock under those conditions.

The peak current is the maximum current achieved during the shock pulse and is measured in amps (A). This is an instantaneous value that is not related to shock duration (pulse on-time). High currents are one way of indicating high shock intensities.

The energy output in a shock pulse is another indicator of shock intensity. It is related to the combination of resistance, voltage, and pulse on-time, and is measured in joules (J). High energy values are another method to indicate high shock intensities. Although manufacturers rate their fence controller's shock intensity in several ways, the use of energy output in joules is quite common.

Safety

The potential for annoying shock pulses in other electrical equipment and other possible damage caused by lightning strikes makes the safe installation and operation of electric fence controllers very important. The controller should be installed and grounded adequately, as indicated in the operator's manual.

The Canadian Standards Association (CSA) tests electric fence controllers to ensure that operation and output is within safe limits. Fence controllers designed for 120 V or less AC operation are tested by CSA to meet the safety standard CAN/CSA C22.2 No. 103-M92, *Electric Fence Controllers*. Battery-powered fence controllers are also included in this standard in an individual section for battery-powered fence controllers operating under 30 V. Additionally, electric fence controllers tested to appropriate Underwriters Laboratories tests, that match CSA tests and are marked with UL(c), are recognized by CSA.

Report Interpretation

This PAMI evaluation report provides data to compare electric fence controllers. To assess a fence controller's performance, both shock delivery and shock intensity must be considered in various conditions. The shock delivery is described using guard voltage. The shock intensity is described using peak amps and energy.

To simulate the 3.3 and 10 mile (5.4 and 16 km) fences in the lab, PAMI used a capacitance of 0.05 μF for the 3.3 mile (5.4 km) fence and 0.15 μF for the 10 mile (16 km) fence. For each fence length, PAMI conducted lab tests over a range of resistances. The resistance values simulate different operating conditions, as shown in **Table 1**. Fence length also affects resistance, but the operating conditions have the most significant effect on resistance.

Table 1. PAMI Simulated Operating Conditions.

Operating Condition	Resistance (kΩ)	
	3.3 mile (5.4 km)	10 mile (16 km)
Uninsulated, Heavy Vegetation, Wet	0.5	0.1
Insulated, Heavy Vegetation, Wet	2	0.5
Uninsulated, Some Vegetation, Wet	2	0.5
Insulated, Some Vegetation, Wet	4	1
Uninsulated, No Vegetation, Wet	4	1
Uninsulated, Heavy Vegetation, Dry	4	1
Insulated, No Vegetation, Wet	20	5
Insulated, Heavy Vegetation, Dry	20	5
Uninsulated, Some Vegetation, Dry	20	5
Insulated, Some Vegetation, Dry	40	10
Uninsulated, No Vegetation, Dry	40	10
Insulated, No Vegetation, Dry	200	40

These operating conditions may differ for every fence and location. Therefore, it is important to understand that the operating condition's effect on fence resistance is dependent on the individual factors of the fence condition. For example, a wet or dry ground condition has the largest effect on resistance. Vegetation contacting the wire would have less of an effect on the fence resistance and even slightly less effect on an insulated fence. In most situations, the ground moisture condition cannot be manually addressed or easily changed. Therefore, to gain resistance for the fence and increase the guard voltage, the fence should have no vegetation contacting the wire and should be well insulated.

The resistance was varied during the lab tests to simulate a variety of operating conditions. However, to simplify comparisons, only two field conditions, "clean" and "weeded", are discussed. The "clean" fence had 4.0 kΩ resistance and was defined as a single wire fence with no vegetation contacting the wire. The "weeded" fence had 0.1 kΩ resistance and was defined as a single wire fence with vegetation contacting the wire.

The guard voltage for both the 3.3 and 10 mile (5.4 and 16 km) fences is illustrated graphically over the assumed operating range. On these graphs the minimum guard voltages for short-haired (dairy cattle) and long-haired (beef cattle) animals are at 700 V and 2,000 V respectively. The shock delivered to the animals would only occur in the operating conditions where the voltage produced by the fence controller is above the minimum guard voltages. An increased guard voltage corresponds with increased fence performance.

The capacitance values of 0.05 μF and 0.15 μF are consistent with other research standards and the 1989 PAMI Evaluation Report 618, *Electric Fence Controllers*. In addition, the resistance values over the operating range and the "clean" and "weeded" resistance values are also consistent with the previous PAMI evaluation report. The operating range of resistance values is also consistent with the range published in the ASAE standard, ASAE S500 DEC99, *Test Procedure for Measuring the Output Characteristics of an Electric Fence Controller*.

Table 2 includes an example of test results for the shock delivery of a fence controller.

Table 2. Shock Delivery Example.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	4,500 V
	Weeded Fence	1,500 V
10 mile	Clean Fence	2,500 V
	Weeded Fence	900 V

The fence controller in the above example would deliver a shock to all animals for both fence lengths if the fence were clean. However, if either fence length had many weeds or grass touching it, a shock would only be delivered to short-haired animals, as the voltage is between 700 V and 2,000 V.

Once it is determined that the controller will deliver a shock for the given fence condition, the shock intensity section of the report will indicate the shock effectiveness. Once again to simplify the comparisons only two outputs will be compared, "dry" and "wet". The "dry" condition represents an animal standing on dry ground while touching the wire. The "wet" condition represents an animal standing on very wet ground while touching the wire. In the shock intensity section, the current output from the fence is shown graphically for a "dry" and a "wet" condition. The peak current in amps (A) and energy in joules (J) is listed for both lengths of fence, and for both output conditions, wet and dry. **Table 3** is an example of the data presented for each electric fence controller.

Table 3. Shock Intensity Example.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	3.0 A	1.5 J
	Wet	20.0 A	6.0 J
10 mile	Dry	2.0 A	1.0 J
	Wet	17.0 A	4.5 J

The shock intensity that the controller produces is dependent on operating conditions. Ground moisture conditions have the largest effect on shock intensity. When the ground is wet, the resistance is low. This results in a low guard voltage but the shock intensity, measured as peak current or energy, is very high. As the ground becomes wetter, the resistance decreases. This causes the guard voltage to decrease but the shock intensity to increase.

In all cases, fence controllers will produce a more intense shock in wet conditions than in dry conditions. This is because the ground conducts electricity back to the controller better when the ground is wet. If ground conditions are very dry, a second fence wire can be used as a ground. When the animal contacts both wires, the shock intensity will be the same as in a wet condition.

Values from the shock delivery and shock intensity tables can be compared to other fence controllers to determine whether shocks will be delivered and the respective outputs in the reported conditions.

Scope of Test

Each electric fence controller was operated in the lab for 24 hours. The performance characteristics were determined using various simulated operating conditions. Each condition was repeated for validity. The controllers were evaluated for quality of work, ease of operation, operator safety, and suitability of the operator's manual.

References

Manitoba Agriculture and Food
Forages & Pastures -
http://www.gov.mb.ca/agriculture/livestock/sheep/bsa01s06

Saskatchewan Agriculture and Food
Fencing Costs -
http://www.agr.gov.sk.ca/DOCS/livestock/beef/production_information/fencing.asp

Alberta Agriculture, Food and Rural Development
Using Electric Fences to Protect Stored Hay from Elk and Deer -
http://www.agric.gov.ab.ca/agdex/600/8400017.html

Protecting Livestock From Predation With Electric Fences -
http://www.agric.gov.ab.ca/agdex/600/684-7.html

Fencing With Electricity - Booklet
http://www.agric.gov.ab.ca/agdex/000/pp7246tc.html
or Call 1-800-292-5697 or (780) 427-0391 and ask for Agdex 724-6

Baygard 1500

Manufacturer and Distributor

Parker McCrory Manufacturing Co.
2000 Forest Ave.
Kansas City, Missouri 64108
U.S.A.
Telephone: 1-800-662-1038
Website: www.parmakusa.com

Retail Outlets

Peavey Mart

Retail Price

$250.00 (December 2000, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Baygard 1500 was 6,840 V for a clean fence condition and 2,400 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.7 A for a dry fence condition and 24.0 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 1.0 J respectively. A shock pulse was delivered every 1.2 seconds.

The Baygard 1500 is a 12 V DC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation. A 70 amp-hour battery would operate the controller for about 4.1 weeks.

The Baygard 1500 does not have CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

No recommendations were required.

General Description

The Baygard 1500 is a low impedance electric fence controller (**Figure 1**). It is designed for 12 V DC operation. An indicator light is provided to indicate controller operation.

The Baygard 1500 controller evaluated by PAMI is manufactured by Baygard-A Division of Bay Mills Ltd. and is identified as such on the controller's label. Parker McCrory Manufacturing Co. has acquired Baygard and a new design of the Baygard 1500 is manufactured under the Parker McCrory Manufacturing Co. name. The Baygard 1500 controller identified as being manufactured by Parker McCrory Manufacturing Co. has not been evaluated in this report.

Figure 1 Baygard 1500 Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 2 and **3** show guard voltage outputs of the Baygard 1500 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 4** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

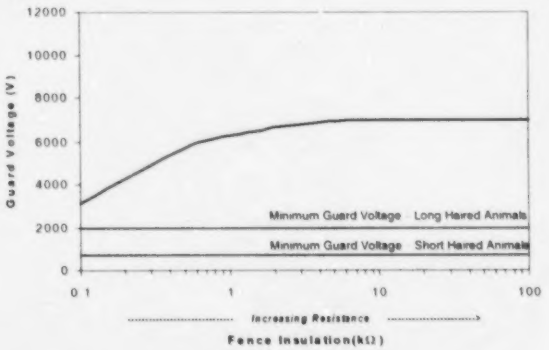


Figure 2 Guard Voltage for 3.3 mile (5.4 km) Fence

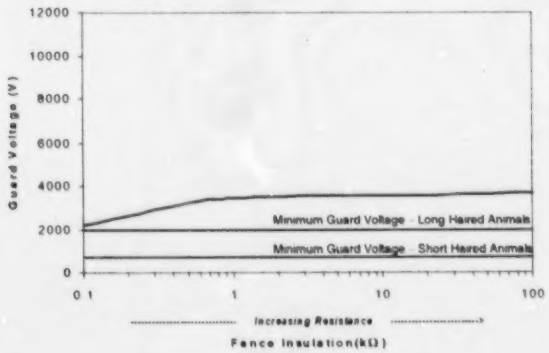


Figure 3 Guard Voltage for 10 mile (16 km) Fence

Table 4 Guard Voltage Data

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,840 V
	Weeded Fence	3,100 V
10 mile	Clean Fence	3,960 V
	Weeded Fence	2,400 V

Baygard 1500

Manufacturer and Distributor

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Retail Outlets

Peavey Mart

Retail Price

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The peak current was 1.7 A for a dry fence condition and 24.0 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 1.0 J respectively. A shock pulse was delivered every 1.2 seconds.

The Baygard 1500 is a 12 V DC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation. A 70 amp-hour battery would operate the controller for about 4.1 weeks.

The Baygard 1500 does not have CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

No recommendations were required.

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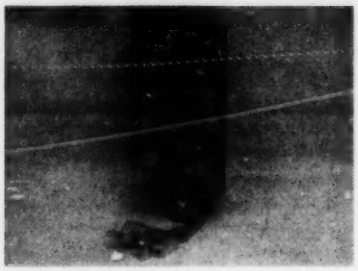

Figure 1. Baygard 1500 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 2 and **3** show guard voltage outputs of the Baygard 1500 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 4** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

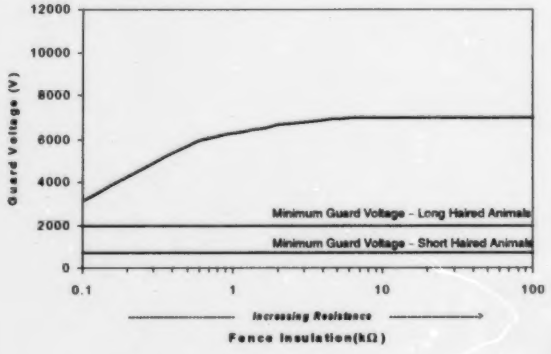

Figure 2. Guard Voltage for 3.3 mile (5.4 km) Fence.

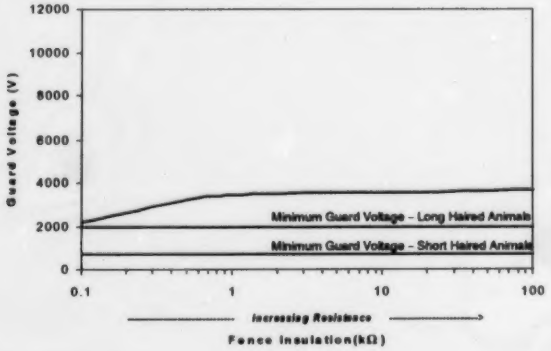

Figure 3. Guard Voltage for 10 mile (16 km) Fence.

Table 4. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,840 V
	Weeded Fence	3,100 V
10 mile	Clean Fence	3,960 V
	Weeded Fence	2,400 V

As can be seen from **Figures 2** and **3**, low resistance did not appreciably affect the shock delivery as the voltage output was above 2,000 V for all fence conditions. Thus, the Baygard 1500 can be expected to deliver shock over a wide range of fence conditions.

The Baygard 1500 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 8360 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Baygard 1500 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 4** and **5**.

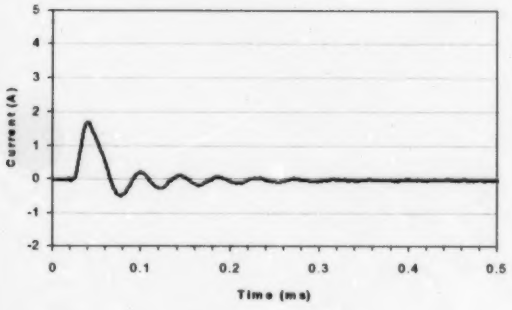

Figure 4. Dry Condition Current Output.

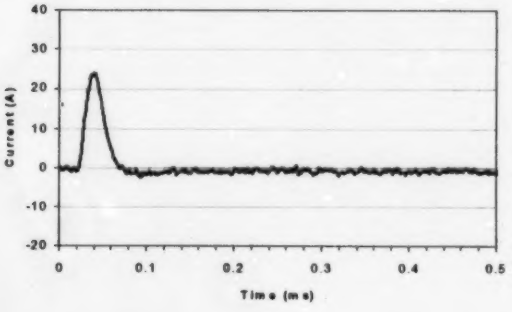

Figure 5. Wet Condition Current Output.

The peak current delivered by the Baygard 1500 and the corresponding energy output at these conditions are provided in **Table 5**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 5. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.7 A	0.2 J
	Wet	31.0 A	1.2 J
10 mile	Dry	1.0 A	0.1 J
	Wet	24.0 A	1.0 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 26 to 60 microseconds.

Ease of Operation

Installation: The Baygard 1500 was equipped with wire leads and clamps for connection to a standard 12 V automotive battery. The controller's enclosure is plastic. The controller is manufactured for outdoor use, but the manufacturer recommends installing it and the battery either in a dry area indoors or in an appropriate weatherproof shelter outdoors.

The controller is equipped with binding post terminals for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Baygard 1500 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking fence indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Battery Consumption: A 12 V, 70 amp-hour battery will operate the Baygard 1500 for about 4.1 weeks, depending on the battery's naturally occurring discharge rate. The consumption rate did increase as the load on the controller increased.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Baygard 1500 is Underwriter's Laboratory (UL) listed. There is no UL(c) marking, thus it is not approved to Canadian Standards Association (CSA) standards.

Operator's Manual

The operator's manual is very good. It outlines safety considerations, installation, grounding, operation, and troubleshooting of the fence controller. Warranty information and service depot locations are also included in the operator's manual.

Warranty

In Canada, the Baygard 1500 is warranted to be free from manufacturing defects for two years from the date of original purchase. Lightning damage is included in this warranty.

In the United States and all other countries other than Canada, the Baygard 1500 is warranted to be free from manufacturing defects for one year from the date of original purchase. Lightning damage is included in this warranty.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Baygard 2000

Manufacturer and Distributor

Parker McCrory Manufacturing Co.
2000 Forest Ave.
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Retail Outlets

Peavey Mart

Retail Price

$119.00 (December 2000, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Baygard 2000 was 6,410 V for a clean fence condition and 2,180 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.6 A for a dry fence condition and 21.9 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 0.8 J respectively. A shock pulse was delivered every 1.2 seconds.

The Baygard 2000 is a 120 V AC unit intended for mounting indoors. No lights are provided on the controller to indicate controller operation or fence charging.

The Baygard 2000 has CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Equipping the energizer with an indicator light(s) to aid in troubleshooting.

General Description

The Baygard 2000 is a low impedance electric fence controller (**Figure 6**). It is designed for 120 V AC operation. No indicator lights are provided to indicate controller operation or fence charging.

The Baygard 2000 controller evaluated by PAMI is manufactured by Baygard-A Division of Bay Mills Ltd. and is identified as such on the controller's label. Parker McCrory Manufacturing Co. has acquired Baygard and a new design of the Baygard 2000 is manufactured under the Parker McCrory Manufacturing Co. name. The Baygard 2000 controller identified as being manufactured by Parker McCrory Manufacturing Co. has not been evaluated in this report.

Figure 6 Baygard 2000 Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 7 and **8** show guard voltage outputs of the Baygard 2000 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 6** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

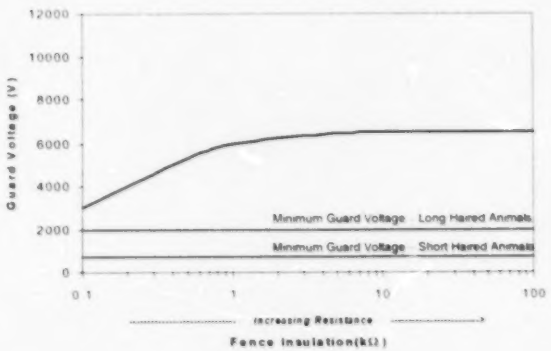

Figure 7 Guard Voltage for 3.3 mile (5.4 km) Fence

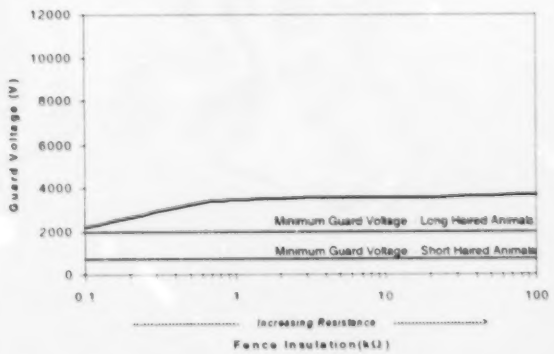

Figure 8 Guard Voltage for 10 mile (16 km) Fence

Table 6 Guard Voltage Data

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,410 V
	Weeded Fence	2,990 V
10 mile	Clean Fence	3,560 V
	Weeded Fence	2,180 V

Baygard 2000

Manufacturer and Distributor

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The peak current was 1.6 A for a dry fence condition and 21.9 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 0.8 J respectively. A shock pulse was delivered every 1.2 seconds.

The Baygard 2000 is a 120 V AC unit intended for mounting indoors. No lights are provided on the controller to indicate controller operation or fence charging.

The Baygard 2000 has CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Equipping the energizer with an indicator light(s) to aid in troubleshooting.

General Description

The Baygard 2000 is a low impedance electric fence controller (**Figure 6**). It is designed for 120 V AC operation. No indicator lights are provided to indicate controller operation or fence charging.

The Baygard 2000 controller evaluated by PAMI is manufactured by Baygard-A Division of Bay Mills Ltd. and is identified as such on the controller's label. Parker McCrory Manufacturing Co. has acquired Baygard and a new design of the Baygard 2000 is manufactured under the Parker McCrory Manufacturing Co. name. The Baygard 2000 controller identified as being manufactured by Parker McCrory Manufacturing Co. has not been evaluated in this report.

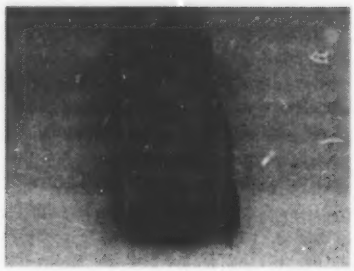

Figure 6. Baygard 2000 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 7 and **8** show guard voltage outputs of the Baygard 2000 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 6** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

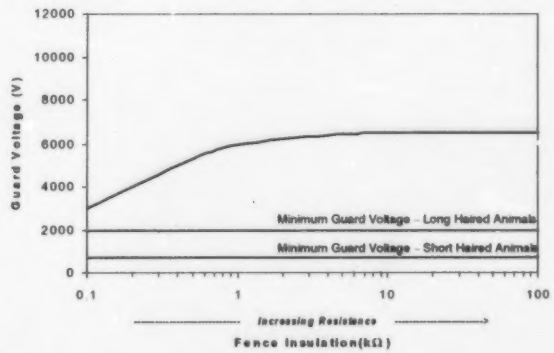

Figure 7. Guard Voltage for 3.3 mile (5.4 km) Fence.

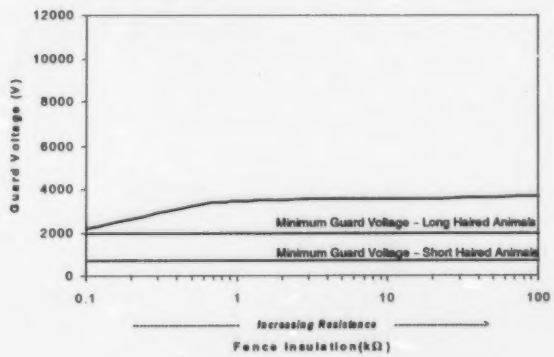

Figure 8. Guard Voltage for 10 mile (16 km) Fence.

Table 6. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,410 V
	Weeded Fence	2,990 V
10 mile	Clean Fence	3,560 V
	Weeded Fence	2,180 V

As can be seen from **Figures 7** and **8**, low resistance did not appreciably affect shock delivery since the voltage output was above 2,000 V for all fence conditions. The Baygard 2000 can be expected to deliver shock over a wide range of fence conditions.

The Baygard 2000 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 6,680 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Baygard 2000 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 9** and **10**.

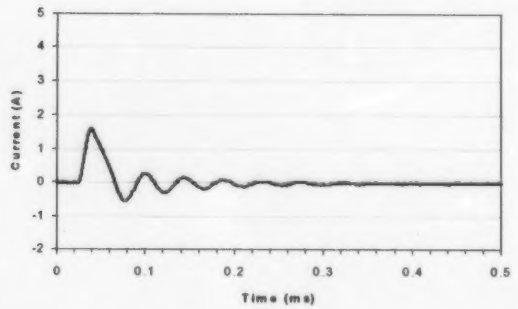

Figure 9. Dry Condition Current Output.

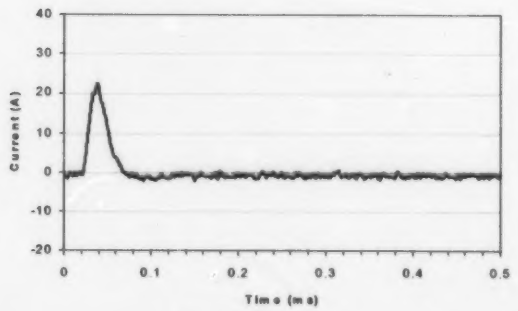

Figure 10. Wet Condition Current Output.

The peak current delivered by the Baygard 2000 and the corresponding energy output at these conditions are provided in **Table 7**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 7. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.6 A	0.2 J
	Wet	29.9 A	1.0 J
10 mile	Dry	0.9 A	0.1 J
	Wet	21.9 A	0.6 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 24 to 60 microseconds.

Ease of Operation

Installation: The Baygard 2000 is equipped with a three-wire grounded cord and attachment plug for connection to a standard, grounded 120 V AC receptacle. The controller's enclosure is plastic. The manufacturer recommends installing the controller indoors in a dry area and as close to the fence and ground rod as practical. The controller is not designed for outdoor installation and use.

The controller is equipped with binding post terminals for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Baygard 2000 is not equipped with any indicator lights. The absence of an indicator light to indicate the controller is functioning makes troubleshooting inconvenient. It is recommended the manufacturer consider equipping the controller with an indicator light(s) to assist with troubleshooting.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Baygard 2000 is Underwriter's Laboratory (UL) tested and listed as UL(c), thus recognized by the Canadian Standards Association (CSA).

Operator's Manual

The operator's manual is very good. It outlines safety considerations, installation, grounding, operation, and troubleshooting of the fence controller. Warranty information and service depot locations are also included in the operator's manual.

Warranty

In Canada, the Baygard 2000 is warranted to be free from manufacturing defects for two years from the date of original purchase. Lightning damage is included in this warranty.

In the United States and all other countries other than Canada, the Baygard 2000 is warranted to be free from manufacturing defects for one year from the date of original purchase. Lightning damage is included in this warranty.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

BULLDOZER Model C402

Manufacturer and Distributor

Zareba Systems
2411 7th Street North-West
P. O. Box 6117
Rochester, Minnesota 55903-6117
U.S.A.
1-800-962-2880
Website: www.zarebasystems.com

Retail Outlets

Princess Auto, Kane Vet Supply, Ag Connections, and Blitz Enterprises

Retail Price

$189.99 (June 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the BULLDOZER Model C402 was 7,080 V for a clean fence condition and 2,210 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.8 A for a dry fence condition and 22.1 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.3 J respectively. A shock pulse was delivered every 1.1 seconds.

The BULLDOZER Model C402 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate fence charging.

The BULLDOZER Model C402 does have CSA approval. The operator's manual is excellent. No durability problems occurred.

Recommendations

No recommendations were required.

General Description

The BULLDOZER Model C402 is a low impedance electric fence controller (**Figure 11**). It is designed for 120 V AC operation. An indicator light is provided to indicate fence charging.

Figure 11 BULLDOZER Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 12 and **13** show guard voltage outputs of the BULLDOZER Model C402 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 8** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

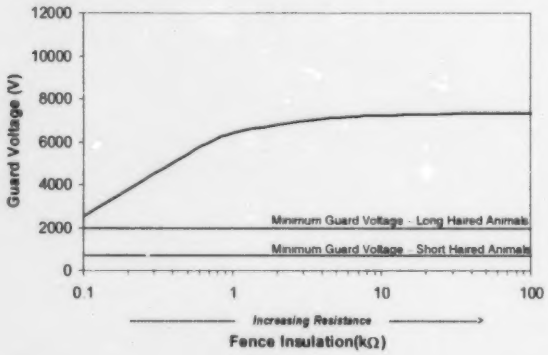

Figure 12 Guard Voltage for 3.3 mile (5.4 km) Fence

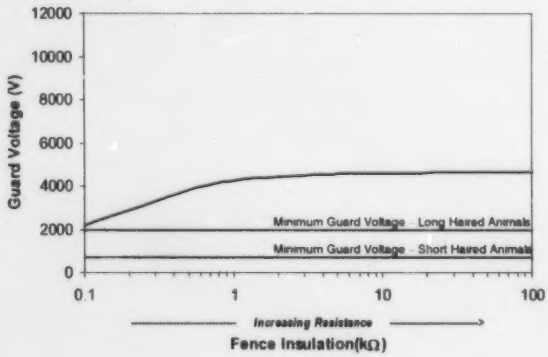

Figure 13 Guard Voltage for 10 mile (16 km) Fence

Table 8 Guard Voltage Data

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,080 V
	Weeded Fence	2,520 V
10 mile	Clean Fence	4,560 V
	Weeded Fence	2,210 V

BULLDOZER Model C402

Manufacturer and Distributor

Zareba Systems
2411 7th Street North-West
P. O. Box 6117
Rochester, Minnesota 55903-6117
U.S.A.
1-800-962-2880
Website: www.zarebasystems.com

Retail Outlets

Princess Auto, Kane Vet Supply, Ag Connections, and Blitz Enterprises

Retail Price

$189.99 (June 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the BULLDOZER Model C402 was 7,080 V for a clean fence condition and 2,210 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.8 A for a dry fence condition and 22.1 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.3 J respectively. A shock pulse was delivered every 1.1 seconds.

The BULLDOZER Model C402 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate fence charging.

The BULLDOZER Model C402 does have CSA approval. The operator's manual is excellent. No durability problems occurred.

Recommendations

No recommendations were required.

General Description

The BULLDOZER Model C402 is a low impedance electric fence controller (**Figure 11**). It is designed for 120 V AC operation. An indicator light is provided to indicate fence charging.

Figure 11. BULLDOZER Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 12 and **13** show guard voltage outputs of the BULLDOZER Model C402 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 8** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

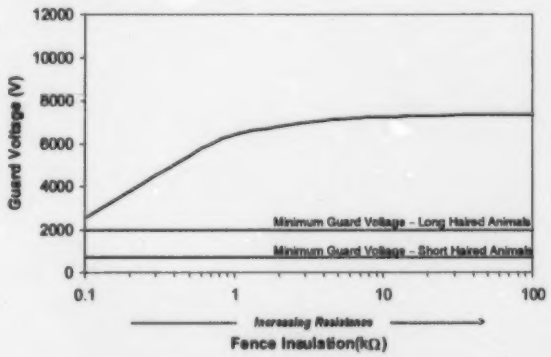

Figure 12. Guard Voltage for 3.3 mile (5.4 km) Fence.

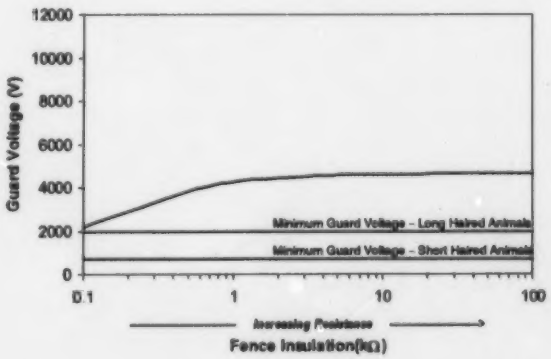

Figure 13. Guard Voltage for 10 mile (16 km) Fence.

Table 8. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,080 V
	Weeded Fence	2,520 V
10 mile	Clean Fence	4,560 V
	Weeded Fence	2,210 V

As can be seen from **Figures 12** and **13**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for all fence conditions. The BULLDOZER Model C402 can be expected to deliver shock over a wide range of fence conditions.

The BULLDOZER Model C402 could effectively be used to energize a fence during cold temperatures. Due to refrigeration mechanical difficulties, the BULLDOZER Model C402 was tested at -26°F (-32°C) instead of -31°F (-35°C). For example, the guard voltage output of the controller at -26°F (-32°C) on a 3.3 mile (5.4 km) single wire fence was about 7,340 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the BULLDOZER Model C402 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 14** and **15**.

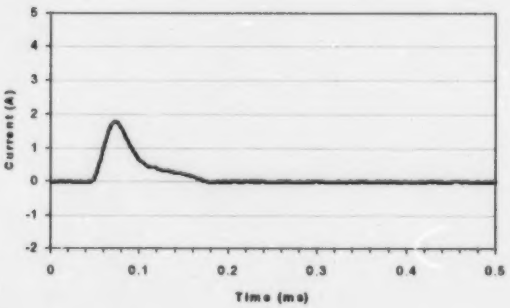

Figure 14. Dry Condition Current Output.

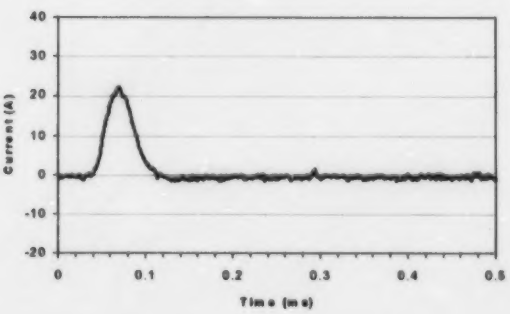

Figure 15. Wet Condition Current Output.

The peak current delivered by the BULLDOZER Model C402 and the corresponding energy output at these conditions is provided in **Table 9**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 9. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.8 A	0.3 J
	Wet	25.2 A	1.5 J
10 mile	Dry	0.5 A	0.2 J
	Wet	22.1 A	1.3 J

Shock Frequency: A shock pulse was delivered every 1.1 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 50 to 126 microseconds.

Ease of Operation

Installation: The BULLDOZER Model C402 is equipped with a polarized two-blade attachment plug for connection to a polarized, 120 V AC receptacle. The controller's enclosure is plastic. The controller is intended to be mounted in a location that is sheltered from the weather, either in a dry area indoors or in an appropriate weatherproof shelter outdoors. The manufacturer recommends installation in a dry area near an electrical receptacle and accessible to a separate ground rod.

The controller is equipped with ring terminal studs for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The BULLDOZER Model C402 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking fence indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The BULLDOZER Model C402 is Canada Standards Association (CSA) approved.

Operator's Manual

The operator's manual is very good. It outlines safety considerations, installation, grounding, and operation of the fence controller. A troubleshooting guide, warranty information, and authorized service depot locations are also included in the operator's manual.

Warranty

The BULLDOZER Model C402 is warranted to be free from defects in materials and workmanship for one year from the date of original purchase. Lightning damage is included in this warranty. The controller also comes with a 30-day money-back guarantee.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

PEL 230

Manufacturer

Tru-Test Ltd.
P.O. Box 51-078, Pakuranga
Auckland, New Zealand
+64-9-978-8888
Website: www.pel.co.nz

Distributor

Kane Veterinary Supplies Ltd.
18150-109 Avenue
Edmonton, Alberta T5S 2K2
(780) 453-1516

Retail Outlets

Contact the Distributor for a listing of retail outlets.

Retail Price

$219.00 (January 2001, f.o.b. Saskatoon, Saskatchewan)

Figure 16. PEL 230 Electric Fence Controller.

Summary and Conclusions

Guard voltage output of the PEL 230 was 8,780 V for a clean fence condition and 3,412 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 34.1 A for a wet fence condition. Energy outputs at these conditions were 0.5 J and 2.9 J respectively. A shock pulse was delivered every 1.2 seconds.

The PEL 230 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation.

The PEL 230 has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Updating the operator's manual to include the PEL 230 in the list of controller models covered by the operator's manual.
2. Providing a more detailed operator's manual, including operating and troubleshooting tips.

General Description

The PEL 230 is a low impedance electric fence controller (**Figure 16**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

Results and Discussion

Quality of Work

Shock Delivery: Figures 17 and **18** show guard voltage outputs of the PEL 230 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 10** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

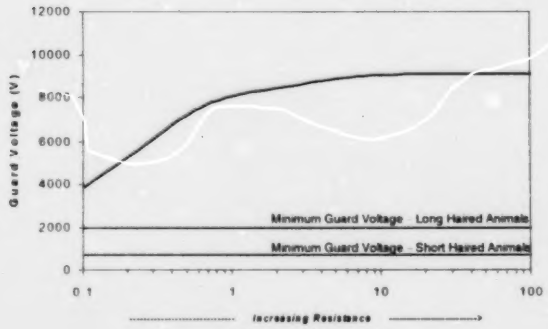

Figure 17 Guard Voltage for 3.3 mile (5.4 km) Fence

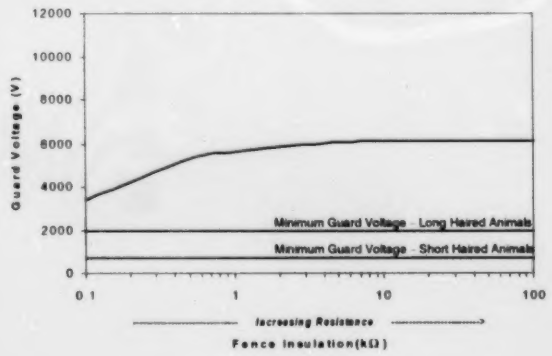

Figure 18 Guard Voltage for 10 mile (16 km) Fence

Table 10 Guard Voltage Data

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,780 V
	Weeded Fence	3,810 V
10 mile	Clean Fence	6,020 V
	Weeded Fence	3,412 V

PEL 230

Manufacturer

Tru-Test Ltd.
P.O. Box 51-078, Pakuranga
Auckland, New Zealand
+64-9-978-8888
Website: www.pel.co.nz

Distributor

Kane Veterinary Supplies Ltd.
18150-109 Avenue
Edmonton, Alberta T5S 2K2
(780) 453-1516

Retail Outlets

Contact the Distributor for a listing of retail outlets.

Retail Price

$219.00 (January 2001, f.o.b. Saskatoon, Saskatchewan)

Summary and Conclusions

Guard voltage output of the PEL 230 was 8,780 V for a clean fence condition and 3,412 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 34.1 A for a wet fence condition. Energy outputs at these conditions were 0.5 J and 2.9 J respectively. A shock pulse was delivered every 1.2 seconds.

The PEL 230 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation.

The PEL 230 has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Updating the operator's manual to include the PEL 230 in the list of controller models covered by the operator's manual.
2. Providing a more detailed operator's manual, including operating and troubleshooting tips.

General Description

The PEL 230 is a low impedance electric fence controller (**Figure 16**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

Figure 16. PEL 230 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 17 and **18** show guard voltage outputs of the PEL 230 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 10** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

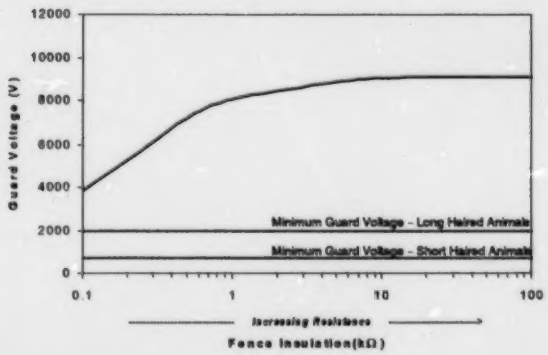

Figure 17. Guard Voltage for 3.3 mile (5.4 km) Fence.

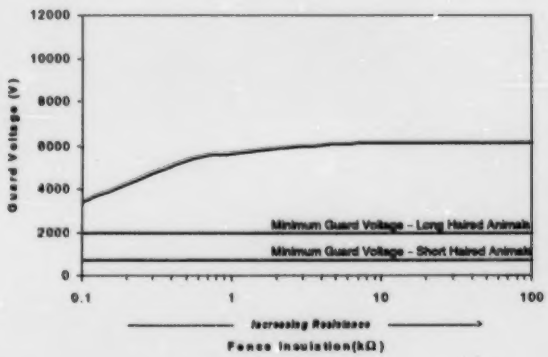

Figure 18. Guard Voltage for 10 mile (16 km) Fence.

Table 10. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,780 V
	Weeded Fence	3,810 V
10 mile	Clean Fence	8,020 V
	Weeded Fence	3,412 V

As can be seen from **Figures 17** and **18**, low resistance did not appreciably affect the shock delivery as the voltage output was above 2,000 V for all fence conditions. Thus, the PEL 230 can be expected to deliver a shock over a wide range of fence conditions.

The PEL 230 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 9,360 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the PEL 230 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 19** and **20**.

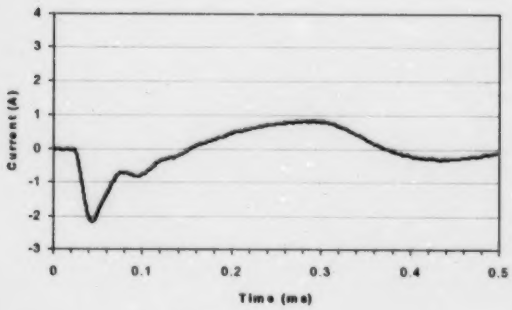

Figure 19. Dry Condition Current Output.

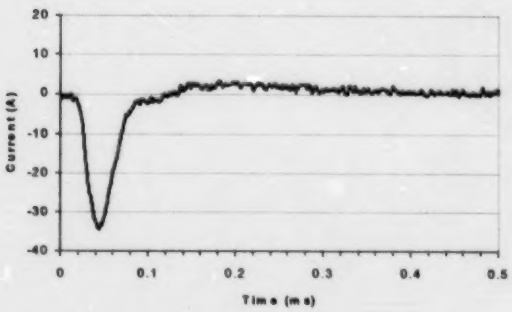

Figure 20. Wet Condition Current Output.

The peak current delivered by the PEL 230 and the corresponding energy output at these conditions are provided in **Table 11**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 11. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.2 A	0.5 J
	Wet	36.1 A	3.2 J
10 mile	Dry	1.5 A	0.4 J
	Wet	34.1 A	2.9 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 58 to 133 microseconds.

Ease of Operation

Installation: The PEL 230 is equipped with a polarized two-blade attachment plug for connection to a polarized, 120 V AC receptacle. The controller's enclosure is plastic. The manufacturer recommends installing the controller indoors in a dry area near and as close to the fence and ground rod as practical. The controller is not designed for outdoor installation and use.

The controller is equipped with ring terminal studs for connection to the fence and ground rod.

For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The PEL 230 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking fence indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions were followed.

The PEL 230 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual provided listed the PEL electric fence controllers the manual applied to, but the PEL 230 was not included in the list. Despite this, the operator's manual provided is good. It outlines safety considerations, installation, grounding, and operation of the fence controller. Warranty information and a product registration card are also included with the operator's manual. However, more detail would have been helpful. In addition to including the PEL 230 in the list of controllers covered by the manual, it is recommended the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

Warranty

The PEL 230 is warranted to be free from defects in materials and workmanship for two years from the date of original purchase. Lightning damage is not included in this warranty. The manufacturer recommends installing the PEL PA 68 Lightning Protection Kit to minimize the effects of a lightning strike.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Red Snap'r LI30

Manufacturer and Distributor

Red Snap'r of Canada
472 Victoria Street
London, Ontario N5Y 4B3
Telephone: (519) 858-3036
Website: www.redsnapr.com

Retail Outlets

Buckerfields, Shar-Care, Ferris Fencing, Playfair Marketing, G & I AgriMarketing, Tru-Value, Co-op, UFA, Peavey Mart

Retail Price

$150.00 (May 2001, f.o.b. Humboldt, Saskatchewan)

Figure 21. Red Snap'r Electric Fence Controller

Summary and Conclusions

Guard voltage output of the Red Snap'r LI30 was 8,960 V for a clean fence condition and 3,290 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 32.9 A for a wet fence condition. Energy outputs at these conditions were 0.4 J and 2.1 J respectively. A shock pulse was delivered every 1.2 seconds.

The Red Snap'r LI30 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof outdoor shelter. An indicator light is provided on the controller to indicate controller operation.

The Red Snap'r LI30 has CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. Red Snap'r warrants all units for one year from date of retail sale, including lightning damage.

General Description

The Red Snap'r LI30 is a low impedance electric fence controller (**Figure 21**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

Results and Discussion

Quality of Work

Shock Delivery: Figures 22 and **23** show guard voltage outputs of the Red Snap'r LI30 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 12** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

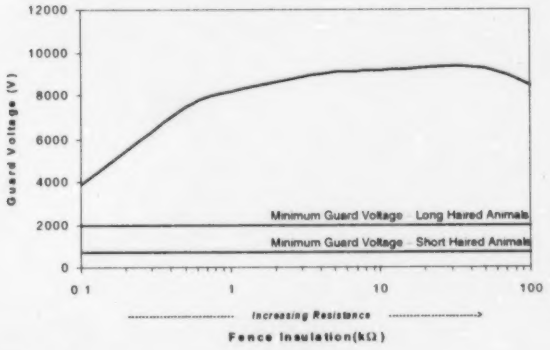

Figure 22. Guard Voltage for 3.3 mile (5.4 km) Fence

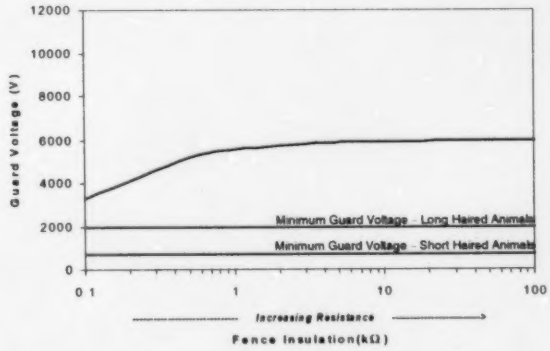

Figure 23. Guard Voltage for 10 mile (16 km) Fence

Table 12. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,960 V
	Weeded Fence	3,900 V
10 mile	Clean Fence	5,870 V
	Weeded Fence	3,290 V

Red Snap'r LI30

Manufacturer and Distributor

Red Snap'r of Canada
472 Victoria Street
London, Ontario N5Y 4B3
Telephone: (519) 858-3036
Website: www.redsnapr.com

Retail Outlets

Buckerfields, Shar-Care, Ferris Fencing, Playfair Marketing, G & I AgriMarketing, Tru-Value, Co-op, UFA, Peavey Mart

Retail Price

$150.00 (May 2001, f.o.b. Humboldt, Saskatchewan)

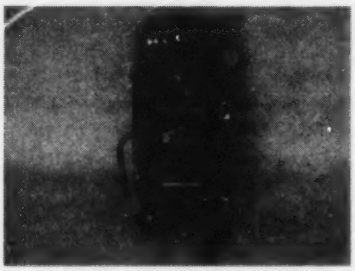

Figure 21. Red Snap'r Electric Fence Controller.

Summary and Conclusions

Guard voltage output of the Red Snap'r LI30 was 8,960 V for a clean fence condition and 3,290 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 32.9 A for a wet fence condition. Energy outputs at these conditions were 0.4 J and 2.1 J respectively. A shock pulse was delivered every 1.2 seconds.

The Red Snap'r LI30 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof outdoor shelter. An indicator light is provided on the controller to indicate controller operation.

The Red Snap'r LI30 has CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. Red Snap'r warrants all units for one year from date of retail sale, including lightning damage.

General Description

The Red Snap'r LI30 is a low impedance electric fence controller (**Figure 21**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

Results and Discussion

Quality of Work

Shock Delivery: Figures 22 and **23** show guard voltage outputs of the Red Snap'r LI30 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 12** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

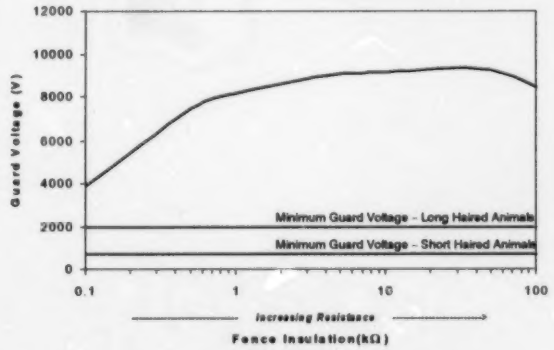

Figure 22. Guard Voltage for 3.3 mile (5.4 km) Fence.

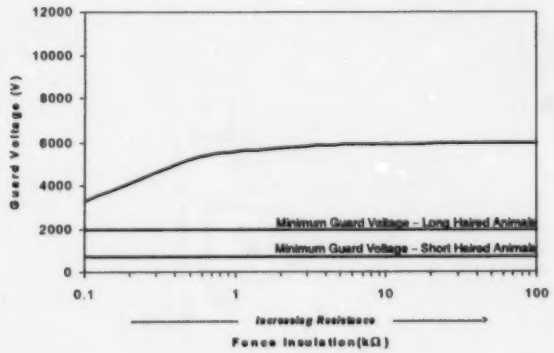

Figure 23. Guard Voltage for 10 mile (16 km) Fence.

Table 12. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,960 V
	Weeded Fence	3,900 V
10 mile	Clean Fence	5,870 V
	Weeded Fence	3,290 V

As can be seen from **Figures 22** and **23**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for all fence conditions. The Red Snap'r LI30 can be expected to deliver shock over a wide range of fence conditions.

The Red Snap'r LI30 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 8990 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000V minimum required to overcome the insulation resistance of long-haired animals, the Red Snap'r LI30 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 24** and **25**.

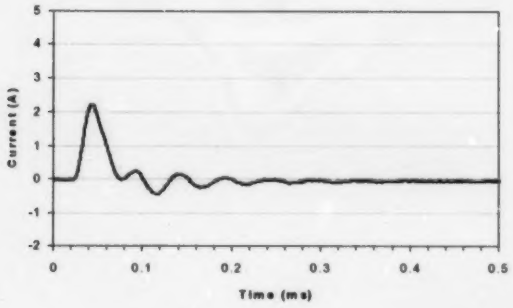

Figure 24. Dry Condition Current Output.

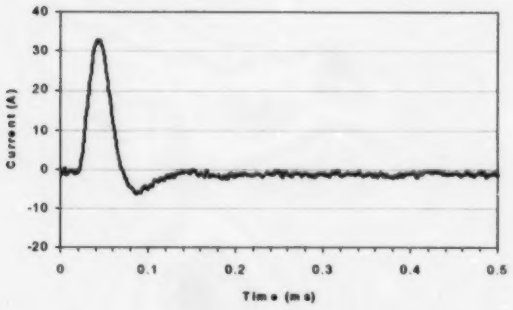

Figure 25. Wet Condition Current Output.

The peak current delivered by the Red Snap'r LI30 and the corresponding energy output at these conditions are provided in **Table 13**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 13. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.2 A	0.4 J
	Wet	39.0 A	2.5 J
10 mile	Dry	1.5 A	0.2 J
	Wet	32.9 A	2.1 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 35 to 74 microseconds.

Ease of Operation

Installation: The Red Snap'r LI30 is equipped with a two-wire cord and a polarized two-blade attachment plug for connection to a polarized, 120 V AC receptacle. The controller's enclosure is plastic. The controller is intended to be mounted in a location that is sheltered from the weather, either in a dry area indoors or in an appropriate weatherproof shelter outdoors. The manufacturer recommends installation in a dry area near an electrical receptacle and accessible to a separate ground rod.

The controller is equipped with binding post terminals for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Red Snap'r LI30 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking fence indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Red Snap'r LI30 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual is very good. It outlines safety considerations, installation, grounding, and operation of the fence controller. A troubleshooting guide, warranty information, and warranty registration card were also included in the operator's manual.

In addition to the grounding instructions included in the operator's manual, a decal on the back of the controller outlines correct grounding procedures.

Warranty

The Red Snap'r LI30 is warranted to be free from defects in materials and workmanship for one year from the date of original purchase. The controller must be returned to the manufacturer for any warranty repair claims.

The warranty section of the operator's manual does not indicate if controller damage caused by lightning is included in the warranty. It is recommended the manufacturer consider including information on lightning damage coverage in the warranty section of the operator's manual.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Red Snap'r LIB30

Manufacturer and Distributor

Red Snap'r of Canada
472 Victoria Street
London, Ontario N5Y 4B3
(519) 858-3036
Website: www.redsnapr.com

Retail Outlets

Buckerfields, Shar-Care, Ferris Fencing, Playfair Marketing, G & I AgriMarketing, Tru-Value, Co-op, UFA, Peavey Mart

Retail Price

$175.00 (May 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Red Snap'r LIB30 was 6,890 V for a clean fence condition and 1,630 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.7 A for a dry fence condition and 16.3 A for a wet fence condition. Energy outputs at these conditions were 0.4 J and 0.9 J respectively. A shock pulse was delivered every 1.6 seconds.

The Red Snap'r LIB30 is a 12 V DC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation. The controller also has a battery saver switch for reduced voltage output. A 70 amp-hour battery would operate the controller for about 2 weeks with the battery saver switch set at normal.

The Red Snap'r LIB30 has CSA approval. The operator's manual is very good. No durability problems occurred; however, the Red Snap'r LIB30 was not operational below 14°F (-10°C).

Recommendations

It is recommended that the manufacturer consider:

1. Including information on lightning damage coverage in the warranty section of the operator's manual.
2. Modifying the LIB30 to ensure proper operation below 14°F (-10°C).

The Manufacturer States that

With regard to recommendation number:

1. Red Snap'r warrants all units for one year from date of retail sale, including lightning damage.
2. All of our fencers are made in Minnesota, where winter temperatures and conditions are very similar to those in western Canada. This test result seemed to be an anomaly as UL testing of the unit concurs that all the components are rated for down to -22°F (-30°C). We have also found that the serial number of the unit shows August 1997 manufacture date. Numerous design changes have occurred to date, including less current consumption and shorter pulse spacing.

General Description

The Red Snap'r LIB30 is a low impedance electric fence controller (**Figure 26**). It is designed for 12 V DC operation. An indicator light is provided to indicate controller operation. A battery saver switch is also provided to extend the life of the battery and reduce the voltage on short or clean fences.

Figure 26. Red Snap'r LIB30 Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 27 and **28** show guard voltage outputs of the Red Snap'r LIB30 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 14** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

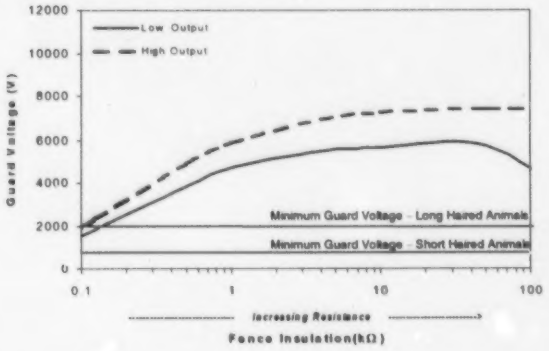

Figure 27. Guard Voltage for 3.3 mile (5.4 km) Fence.

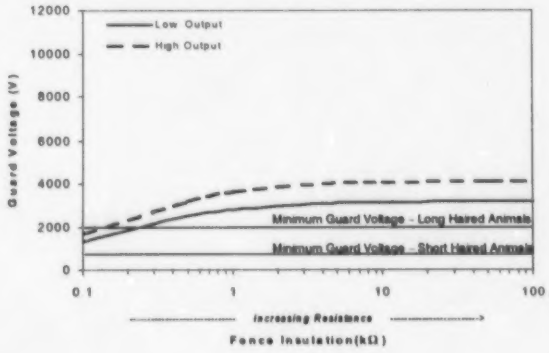

Figure 28. Guard Voltage for 10 mile (16 km) Fence.

Table 14. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,890 V
	Weeded Fence	1,910 V
10 mile	Clean Fence	3,980 V
	Weeded Fence	1,630 V

Red Snap'r LIB30

Manufacturer and Distributor

Red Snap'r of Canada
472 Victoria Street
London, Ontario N5Y 4B3
(519) 858-3036
Website: www.redsnapr.com

Retail Outlets

Buckerfields, Shar-Care, Ferris Fencing, Playfair Marketing, G & I AgriMarketing, Tru-Value, Co-op, UFA, Peavey Mart

Retail Price

$175.00 (May 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Red Snap'r LIB30 was 6,890 V for a clean fence condition and 1,630 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.7 A for a dry fence condition and 16.3 A for a wet fence condition. Energy outputs at these conditions were 0.4 J and 0.9 J respectively. A shock pulse was delivered every 1.6 seconds.

The Red Snap'r LIB30 is a 12 V DC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. An indicator light is provided on the controller to indicate controller operation. The controller also has a battery saver switch for reduced voltage output. A 70 amp-hour battery would operate the controller for about 2 weeks with the battery saver switch set at normal.

The Red Snap'r LIB30 has CSA approval. The operator's manual is very good. No durability problems occurred; however, the Red Snap'r LIB30 was not operational below 14°F (-10°C).

Recommendations

It is recommended that the manufacturer consider:

1. Including information on lightning damage coverage in the warranty section of the operator's manual.
2. Modifying the LIB30 to ensure proper operation below 14°F (-10°C).

The Manufacturer States that

With regard to recommendation number:

1. Red Snap'r warrants all units for one year from date of retail sale, including lightning damage.
2. All of our fencers are made in Minnesota, where winter temperatures and conditions are very similar to those in western Canada. This test result seemed to be an anomaly as UL testing of the unit concurs that all the components are rated for down to -22°F (-30°C). We have also found that the serial number of the unit shows August 1997 manufacture date. Numerous design changes have occurred to date, including less current consumption and shorter pulse spacing.

General Description

The Red Snap'r LIB30 is a low impedance electric fence controller (**Figure 26**). It is designed for 12 V DC operation. An indicator light is provided to indicate controller operation. A battery saver switch is also provided to extend the life of the battery and reduce the voltage on short or clean fences.

Figure 26. Red Snap'r LIB30 Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 27 and **28** show guard voltage outputs of the Red Snap'r LIB30 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 14** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

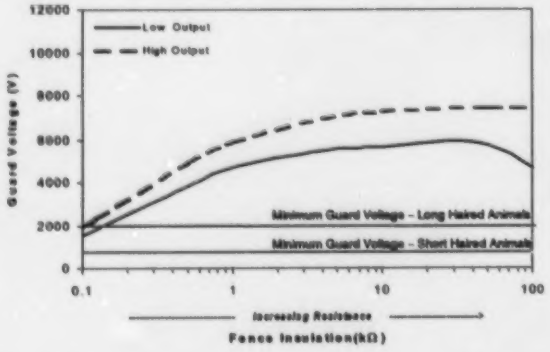

Figure 27. Guard Voltage for 3.3 mile (5.4 km) Fence.

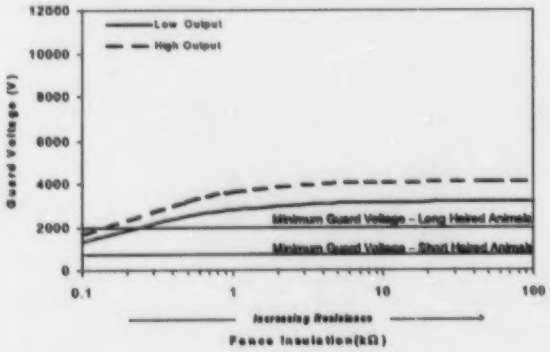

Figure 28. Guard Voltage for 10 mile (16 km) Fence.

Table 14. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	6,890 V
	Weeded Fence	1,010 V
10 mile	Clean Fence	3,080 V
	Weeded Fence	1,630 V

As can be seen from **Figures 27** and **28**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for nearly all fence conditions. The Red Snap'r LIB30 can be expected to deliver shock over a wide range of fence conditions.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 29** and **30**.

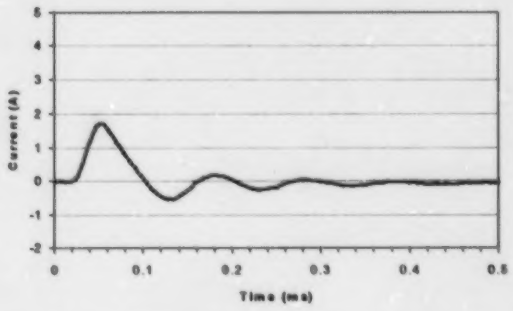

Figure 29. Dry Condition Current Output.

The Red Snap'r LIB30 could not effectively be used to energize a fence at temperatures below 14°F (-10°C). Below this temperature, the unit's fuse would blow. Once the temperature was above 14°F (-10°C), the guard voltage output of the controller on a 3.3 mile (5.4 km) single wire fence was about 8,660 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation it was suitable for winter operations warmer than 14°F (-10°C).

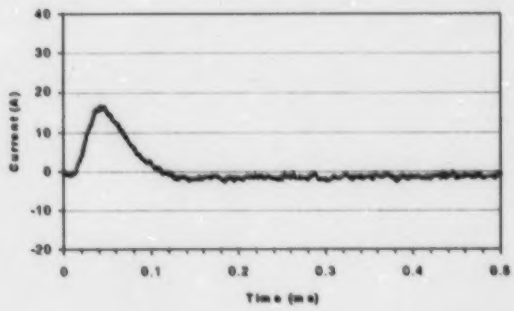

Figure 30. Wet Condition Current Output.

The peak current delivered by the Red Snap'r LIB30 and the corresponding energy output at these conditions are provided in **Table 15.** Energy and current outputs for other fence conditions are given in **Appendix II.** The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 15. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.7 A	0.4 J
	Wet	19.0 A	1.0 J
10 mile	Dry	1.0 A	0.2 J
	Wet	16.3 A	0.9 J

Shock Frequency: A shock pulse was delivered every 1.6 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 54 to 121 microseconds.

Ease of Operation

Installation: The Red Snap'r LIB30 is equipped with wire leads and clamps for connection to a standard 12 V automotive battery. The controller's enclosure is plastic. The controller and battery are intended to be mounted in a location that is sheltered from the weather, either in a dry area indoors or in an appropriate weatherproof shelter outdoors.

The controller is equipped with binding post terminals for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Red Snap'r LIB30 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking fence indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Battery Consumption: The controller is equipped with a battery saver switch for extending the life of the battery and reducing the voltage on short or clean fences. A 12 V, 70 amp-hour battery will operate the Red Snap'r LIB30 for about 2 weeks with the battery saver switch set at normal, and for about 4.1 weeks with the switch set at low. These times depend on the battery's naturally occurring discharge rate. The consumption rate did increase as the load on the controller increased.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Red Snap'r LIB30 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual is very good. It outlines safety considerations, installation, grounding, and operation of the fence controller. A troubleshooting guide, warranty information, and warranty registration card are also included in the operator's manual.

In addition to the grounding instructions included in the operator's manual, a decal on the back of the controller outlines correct grounding procedures.

Warranty

The Red Snap'r LIB30 is warranted to be free from defects in materials and workmanship for one year from the date of original purchase.

The warranty section of the operator's manual does not indicate if controller damage caused by lightning is covered by the warranty. It is recommended the manufacturer consider including information on lightning damage coverage in the warranty section of the operator's manual.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Stafix M3.2

Manufacturer

Tru-Test Ltd.
P. O. Box 51-078, Pakuranga
Auckland, New Zealand
+64-9-978-8888
Website: www.tru-test.com

Distributor

Ranger Fence & Wire Products
2252 Heritage Lane, Rd 7
Peterborough, Ontario K9J 6X8
(705) 295-4474

Retail Outlets

Range Fence and Wire Products, Ontario

Retail Price

$375 (January 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Stafix M3.2 was 10,710 V for a clean fence condition and 2,750 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.7 A for a dry fence condition and 27.5 A for a wet fence condition. Energy outputs at these conditions were 0.9 J and 3.1 J respectively. A shock pulse was delivered every 1.2 seconds.

The Stafix M3.2 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. Two indicator lights are provided on the controller to indicate AC line condition and controller operation.

The Stafix M3.2 has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including operating and troubleshooting tips.

The Manufacturer States that

With regard to recommendation number:

1. A more comprehensive guide to electric fencing is now included in all Stafix powered energizers. This booklet, the "Stafix Fence Manual", is a detailed guide to electric fencing, including troubleshooting. This manual is due for a further revision in the near future. Future updates will also be posted on the Tru-Test website, www.tru-test.com.

Manufacturer's Additional Comments

The Stafix M3.2 has a "low power terminal". This differs from a "low power setting" in that a wire can be permanently attached to this terminal in addition to the full power terminal. Thus, the farmer has the ability to simultaneously use the high power terminal to supply the bulk of the farm, while the low power terminal can be used to power shorter fences where less power is required.

General Description

The Stafix M3.2 is a low impedance electric fence controller (**Figure 31**). It is designed for 120 V AC operation. Indicator lights are provided to indicate AC line condition and controller operation.

Figure 31. Stafix M3.2 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: **Figures 32** and **33** show guard voltage outputs of the Stafix M3.2 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 16** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

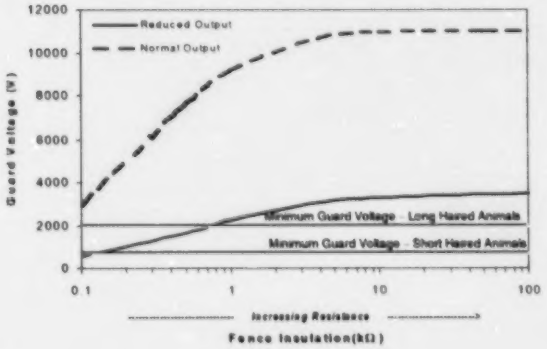

Figure 32. Guard Voltage for 3.3 mile (5.4 km) Fence.

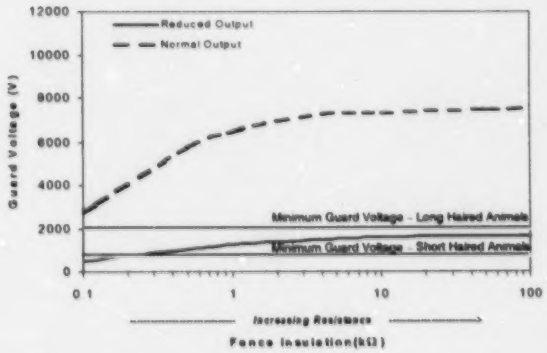

Figure 33. Guard Voltage for 10 mile (16 km) Fence.

Table 16. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	10,710 V
	Weeded Fence	2,940 V
10 mile	Clean Fence	7,220 V
	Weeded Fence	2,750 V

Stafix M3.2

Manufacturer

Tru-Test Ltd.
P. O. Box 51-078, Pakuranga
Auckland, New Zealand
+64-9-978-8888
Website: www.tru-test.com

Distributor

Ranger Fence & Wire Products
2252 Heritage Lane, Rd 7
Peterborough, Ontario K9J 6X8
(705) 295-4474

Retail Outlets

Range Fence and Wire Products, Ontario

Retail Price

$375 (January 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Stafix M3.2 was 10,710 V for a clean fence condition and 2,750 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.7 A for a dry fence condition and 27.5 A for a wet fence condition. Energy outputs at these conditions were 0.9 J and 3.1 J respectively. A shock pulse was delivered every 1.2 seconds.

The Stafix M3.2 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. Two indicator lights are provided on the controller to indicate AC line condition and controller operation.

The Stafix M3.2 has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including operating and troubleshooting tips.

The Manufacturer States that

With regard to recommendation number:

1. A more comprehensive guide to electric fencing is now included in all Stafix powered energizers. This booklet, the "Stafix Fence Manual", is a detailed guide to electric fencing, including troubleshooting. This manual is due for a further revision in the near future. Future updates will also be posted on the Tru-Test website, www.tru-test.com.

Manufacturer's Additional Comments

The Stafix M3.2 has a "low power terminal". This differs from a "low power setting" in that a wire can be permanently attached to this terminal in addition to the full power terminal. Thus, the farmer has the ability to simultaneously use the high power terminal to supply the bulk of the farm, while the low power terminal can be used to power shorter fences where less power is required.

General Description

The Stafix M3.2 is a low impedance electric fence controller (**Figure 31**). It is designed for 120 V AC operation. Indicator lights are provided to indicate AC line condition and controller operation.

Figure 31. Stafix M3.2 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: **Figures 32** and **33** show guard voltage outputs of the Stafix M3.2 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 16** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

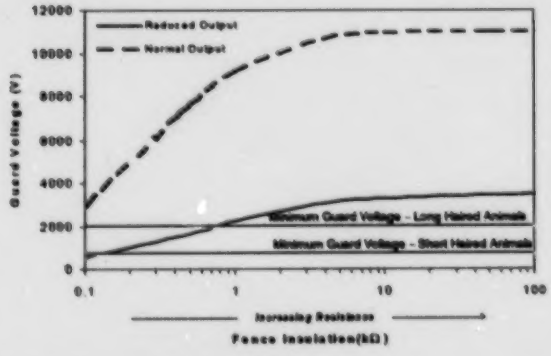

Figure 32. Guard Voltage for 3.3 mile (5.4 km) Fence.

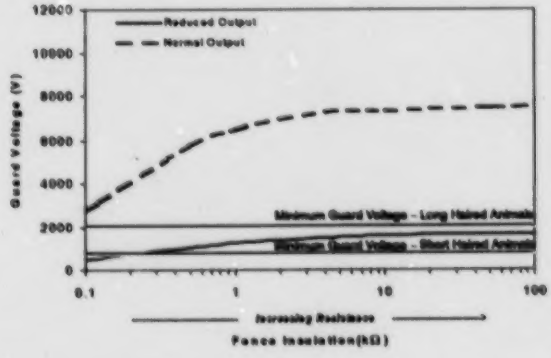

Figure 33. Guard Voltage for 10 mile (16 km) Fence.

Table 16. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	10,710 V
	Weeded Fence	2,940 V
10 mile	Clean Fence	7,220 V
	Weeded Fence	2,750 V

As can be seen from **Figures 32** and **33**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for all fence conditions in the full power setting. The Stafix M3.2 can be expected to deliver shock over a wide range of fence conditions. The Stafix M3.2 was below the 2,000 V minimum guard voltage in the reduced power setting for some fence conditions.

The Stafix M3.2 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 11,030 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Stafix M3.2 was suitable for winter operation. However in the reduced power setting, the Stafix M3.2 was below the 2,000 V minimum guard voltage for some fence conditions.

Shock Intensity: Current output for dry and wet conditions are shown in **Figures 34** and **35**.

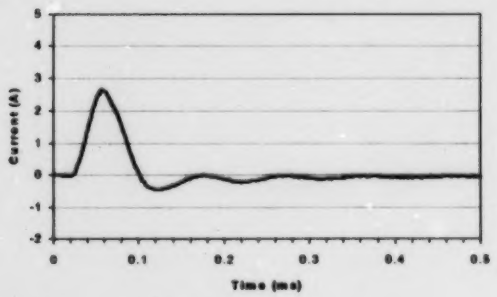

Figure 34. Dry Condition Current Output.

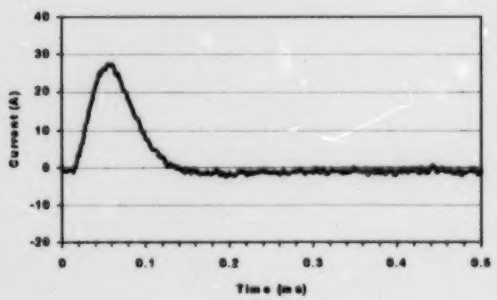

Figure 35. Wet Condition Current Output.

The peak current delivered by the Stafix M3.2 and the corresponding energy output at these conditions are provided in **Table 17**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output, as determined by the operating conditions.

Table 17. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.7 A	0.9 J
	Wet	29.4 A	3.4 J
10 mile	Dry	1.8 A	0.6 J
	Wet	27.5 A	3.1 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 73 to 299 microseconds.

Ease of Operation

Installation: The Stafix M3.2 is equipped with a polarized two-blade attachment plug for connection to a polarized, 120 V AC receptacle. The controller's enclosure is plastic. The controller is intended to be mounted in a location that is sheltered from the weather, either in a dry area indoors or in an appropriate weatherproof shelter outdoors. The manufacturer recommends installation in a dry area near an electrical receptacle and accessible to a separate ground rod.

The controller is equipped with ring terminal studs for connection to the fence and ground rod. Two fence connection terminals are provided: a full power terminal and a reduced power terminal. The reduced power terminal can be connected to short or clean fences where full power may not be required.

For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Stafix M3.2 is equipped with two indicator lights for convenient troubleshooting of AC line condition and fence charging. The power indicator light remains lit provided that power is supplied to the controller. The pulse indicator light blinks with each pulse, indicating the controller is functioning and the fence is not shorted out. The pulse light will get dimmer as fence load increases, indicating that fence maintenance (i.e. clearing vegetation from the fence) is required. The lights worked well and were easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Stafix M3.2 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual is good. It outlines safety considerations, installation, grounding, and operation of the fence controller. However, more detail would have been helpful. It is recommended the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

A warranty registration card is also included as part of the controller's documentation package.

Warranty

The Stafix M3.2 is warranted to be free from defects in materials and workmanship for two years from the date of original purchase. Lightning damage is included in this warranty.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Stinger Plus AC

Manufacturer and Distributor

OKKO Inc.
2430 – 80th Avenue
Edmonton, Alberta T6P 1N2
1-800-661-3617
Website: www.beetronics.okko.com

Retail Outlets

Contact for Outlets:
G & I Agri-Marketing
815 Victoria Ave E
Winnipeg, Manitoba R2C 0G4
Telephone: (204) 224-1925

Retail Price

$219.99 (December 2000, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Stinger Plus AC was 8,820 V for a clean fence condition and 3,210 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 32.1 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.6 J respectively. A shock pulse was delivered every 1.1 seconds.

The Stinger Plus AC is a 120 V AC unit intended for outdoor use. An indicator light is provided on the controller to indicate controller operation.

The Stinger Plus AC has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including warranty information and procedures for warranty claims in the operator's manual.
2. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. The manufacturer is in the process of revising their manual, which will incorporate new information on improved warranty coverage including lightning damage.
2. Stinger fencers carry a two year full replacement warranty, and a third year covering parts only with a flat $25 fee for labour. The fencers have less than a 1% failure rate due to workmanship or components, and cover damage caused by lightning strikes.

Manufacturer's Additional Comments

Stinger fencers have one of the best warranties in the industry and only utilize the highest quality components. Our experienced Production Manager ensures every fencer undergoes extensive testing before leaving our fabrication facility to provide exceptional performance for our customers.

General Description

The Stinger Plus AC is a low impedance electric fence controller (**Figure 36**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

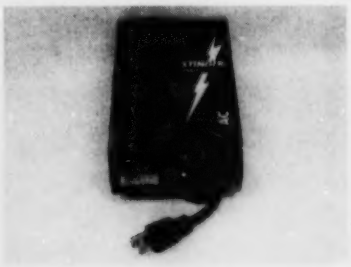

Figure 36. Stinger Plus AC Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 37 and **38** show guard voltage outputs of the Stinger Plus AC for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 18** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

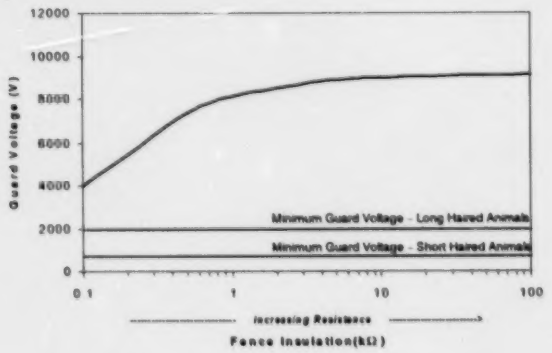

Figure 37. Guard Voltage for 3.3 mile (5.4 km) Fence.

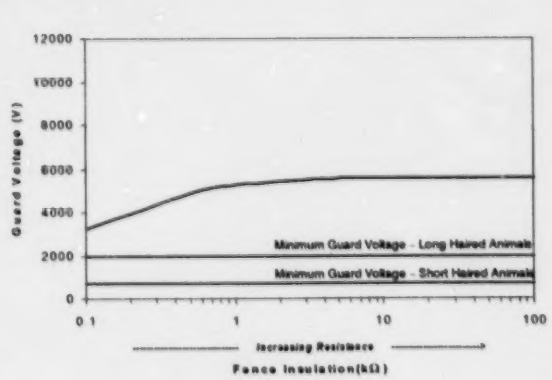

Figure 38. Guard Voltage for 10 mile (16 km) Fence.

Stinger Plus AC

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Summary and Conclusions

Guard voltage output of the Stinger Plus AC was 8,820 V for a clean fence condition and 3,210 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 32.1 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.6 J respectively. A shock pulse was delivered every 1.1 seconds.

The Stinger Plus AC is a 120 V AC unit intended for outdoor use. An indicator light is provided on the controller to indicate controller operation.

The Stinger Plus AC has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including warranty information and procedures for warranty claims in the operator's manual.
2. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. The manufacturer is in the process of revising their manual, which will incorporate new information on improved warranty coverage including lightning damage.
2. Stinger fencers carry a two year full replacement warranty, and a third year covering parts only with a flat $25 fee for labour. The fencers have less than a 1% failure rate due to workmanship or components, and cover damage caused by lightning strikes.

Manufacturer's Additional Comments

Stinger fencers have one of the best warranties in the industry and only utilize the highest quality components. Our experienced Production Manager ensures every fencer undergoes extensive testing before leaving our fabrication facility to provide exceptional performance for our customers.

General Description

The Stinger Plus AC is a low impedance electric fence controller (**Figure 36**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

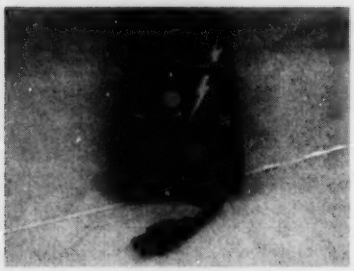

Figure 36. Stinger Plus AC Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 37 and **38** show guard voltage outputs of the Stinger Plus AC for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 18** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

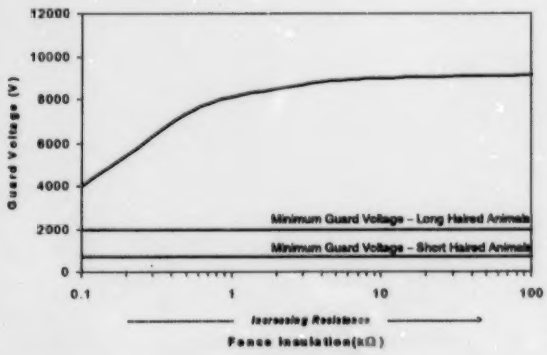

Figure 37. Guard Voltage for 3.3 mile (5.4 km) Fence.

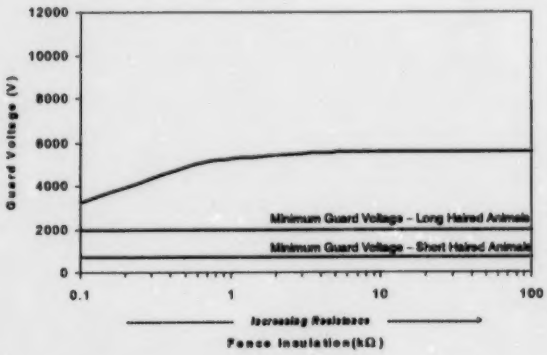

Figure 38. Guard Voltage for 10 mile (16 km) Fence

Table 18. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,820 V
	Weeded Fence	4,000 V
10 mile	Clean Fence	5,530 V
	Weeded Fence	3,210 V

As can be seen from **Figures 37** and **38**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for all fence conditions. The Stinger Plus AC can be expected to deliver shock over a wide range of fence conditions.

The Stinger Plus AC could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 8,710 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Stinger Plus AC was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 39** and **40**.

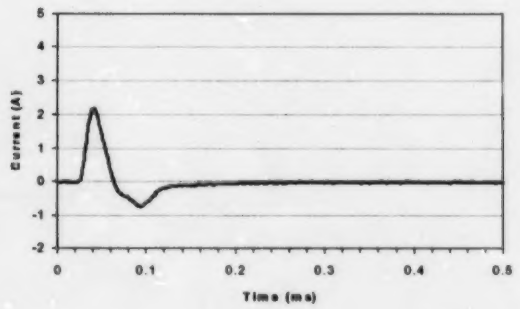

Figure 39. Dry Condition Current Output.

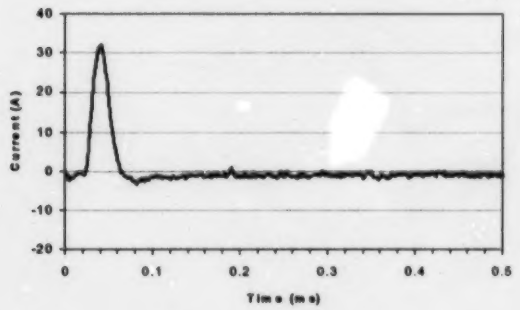

Figure 40. Wet Condition Current Output.

The peak current delivered by the Stinger Plus AC and the corresponding energy output at these conditions are provided in **Table 19.** Energy and current outputs for other fence conditions are given in **Appendix II.** The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 19. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.2 A	0.5 J
	Wet	40.0 A	2.1 J
10 mile	Dry	1.4 A	0.2 J
	Wet	32.1 A	1.6 J

Shock Frequency: A shock pulse was delivered every 1.1 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 27 to 53 microseconds.

Ease of Operation

Installation: The Stinger Plus AC is equipped with a three-wire cord and attachment plug for connection to a standard, grounded 120 V AC receptacle. The controller's enclosure is plastic and water resistant. The controller can be mounted outdoors since its enclosure is water resistant.

The controller is equipped with binding post terminals for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Stinger Plus AC is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking power output indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Stinger Plus AC is Canadian Standards Association (CSA) and Underwriter's Laboratory (UL) approved.

Operator's Manual

The operator's manual is good. It outlines safety considerations, installation, grounding, operation, and troubleshooting of the fence controller. Warranty information is not included in the operator's manual. It is recommended the manufacturer consider including warranty information and procedures for warranty claims in the operator's manual.

Warranty

The Stinger Plus AC has a two-year, across the counter warranty and a third year parts warranty.

The operator's manual does not indicate if controller damage caused by lightning is covered by the warranty. It is recommended the manufacturer consider including information on lightning damage coverage in the warranty section of the operator's manual.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Stinger Plus DC

Manufacturer and Distributor

OKKO Inc.
2430 – 80th Avenue
Edmonton, Alberta T6P 1N2
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Retail Outlets

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Telephone: (204) 224-1925

Retail Price

$229.99 (Jan. 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions

Guard voltage output of the Stinger Plus DC was 8,750 V for a clean fence condition and 3,020 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 30.2 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.5 J, respectively. A shock pulse was delivered every 3.2 seconds.

The Stinger Plus DC is a 12 V DC unit intended for outdoor use. Indicator lights are provided on the controller to indicate controller operation and battery condition. The controller also comes equipped with a light sensor for reduced pulse rate and current draw at night. A 70 amp-hour battery would last about 2 weeks during daylight hours and 7 weeks during night hours.

The Stinger Plus DC has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including warranty information and procedures for warranty claims in the operator's manual.
2. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. The manufacturer is in the process of revising their manual, which will incorporate new information on improved warranty coverage including lightning damage.
2. Stinger fencers carry a two year full replacement warranty, and a third year covering only parts with a flat $25 fee for labour. Our fencers have less than a 1% failure rate due to workmanship or components and cover damage caused by lightning strikes.

Manufacturer's Additional Comments

Stinger fencers have one of the best warranties in the industry and only utilize the highest quality components. Our experienced Production Manager ensures every fencer undergoes extensive testing before leaving our fabrication facility to provide exceptional performance for our customers.

General Description

The Stinger Plus DC is a low impedance electric fence controller (**Figure 41**). It is designed for 12 V DC operation. A power output indicator light that flashes when the controller is operating is provided. Also provided are a battery status light and a light sensor that reduces the pulse rate and current draw for battery conservation.

Figure 41. Stinger Plus DC Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 42 and **43** show guard voltage outputs of the Stinger Plus DC for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 20** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

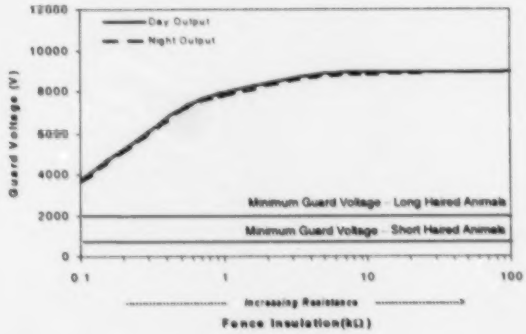

Figure 42. Guard Voltage for 3.3 mile (5.4 km) Fence.

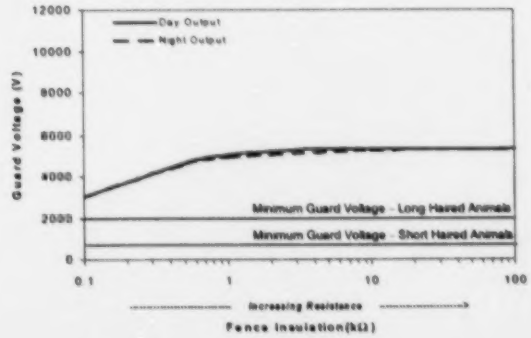

Figure 43. Guard Voltage for 10 mile (16 km) Fence.

Stinger Plus DC

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Guard voltage output of the Stinger Plus DC was 8,750 V for a clean fence condition and 3,020 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.2 A for a dry fence condition and 30.2 A for a wet fence condition. Energy outputs at these conditions were 0.3 J and 1.5 J, respectively. A shock pulse was delivered every 3.2 seconds.

The Stinger Plus DC is a 12 V DC unit intended for outdoor use. Indicator lights are provided on the controller to indicate controller operation and battery condition. The controller also comes equipped with a light sensor for reduced pulse rate and current draw at night. A 70 amp-hour battery would last about 2 weeks during daylight hours and 7 weeks during night hours.

The Stinger Plus DC has CSA approval. The operator's manual is good. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Including warranty information and procedures for warranty claims in the operator's manual.
2. Including information on lightning damage coverage in the warranty section of the operator's manual.

The Manufacturer States that

With regard to recommendation number:

1. The manufacturer is in the process of revising their manual, which will incorporate new information on improved warranty coverage including lightning damage.
2. Stinger fencers carry a two year full replacement warranty, and a third year covering only parts with a flat $25 fee for labour. Our fencers have less than a 1% failure rate due to workmanship or components and cover damage caused by lightning strikes.

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General Description

The Stinger Plus DC is a low impedance electric fence controller (**Figure 41**). It is designed for 12 V DC operation. A power output indicator light that flashes when the controller is operating is provided. Also provided are a battery status light and a light sensor that reduces the pulse rate and current draw for battery conservation.

Figure 41. Stinger Plus DC Electric Fence Controller

Results and Discussion

Quality of Work

Shock Delivery: Figures 42 and **43** show guard voltage outputs of the Stinger Plus DC for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 20** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

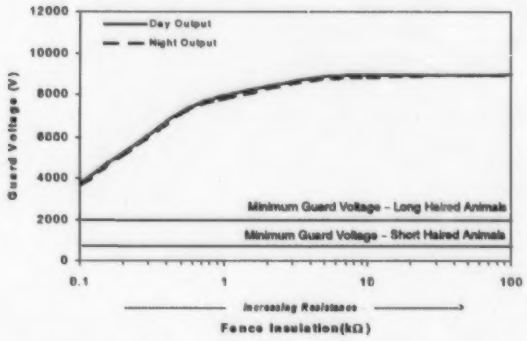

Figure 42. Guard Voltage for 3.3 mile (5.4 km) Fence.

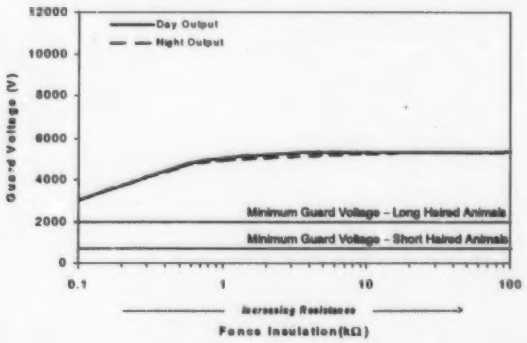

Figure 43. Guard Voltage for 10 mile (16 km) Fence.

Table 20. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	8,750 V
	Weeded Fence	3,710 V
10 mile	Clean Fence	5,310 V
	Weeded Fence	3,020 V

As can be seen from **Figures 42** and **43**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for all fence conditions. The Stinger Plus DC can be expected to deliver shock over a wide range of fence conditions.

The Stinger Plus DC could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 8,360 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Stinger Plus DC was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in **Figures 44** and **45**.

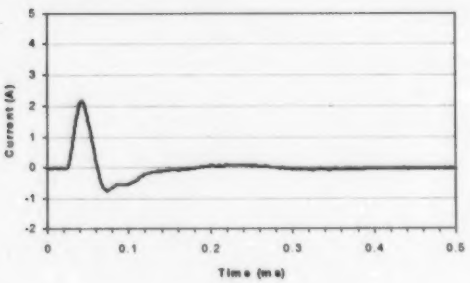

Figure 44. Dry Condition Current Output

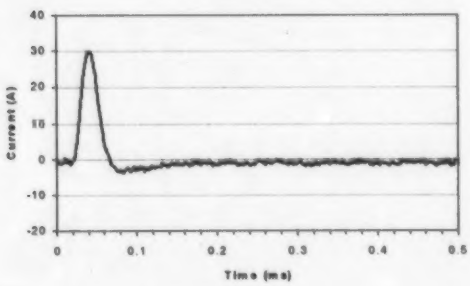

Figure 45. Wet Condition Current Output.

The peak current delivered by the Stinger Plus DC and the corresponding energy output at these conditions are provided in **Table 21**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 21. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.2 A	0.3 J
	Wet	37.1 A	2.0 J
10 mile	Dry	1.3 A	0.2 J
	Wet	30.2 A	1.5 J

Shock Frequency: A shock pulse was delivered every 1.3 seconds and 3.2 seconds during day and night operations respectively. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 29 to 51 microseconds.

Ease of Operation

Installation: The Stinger Plus DC is equipped with wire leads and clamps for connection to a standard 12 V automotive battery. The controller's enclosure is plastic and water resistant. The controller can be mounted outdoors since its enclosure is water resistant.

The controller is equipped with binding post terminals for connection to the fence and ground rod.

For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Stinger Plus DC, Model SPD-9601, is equipped with two indicator lights for convenient troubleshooting of controller operation and battery condition. A flashing power output indicator light indicates the controller is functioning and the fence is not shorted out. A battery status light indicates battery condition. The lights worked well and were easy to see under normal indoor lighting conditions.

Battery Consumption: The controller is equipped with a light sensor to reduce pulse rate and current draw at night. A 12 V, 70 amp-hour battery will operate the Stinger Plus DC for about 2 weeks in normal operating mode, and for about 7 weeks when the pulse rate and current draw is reduced by the controller's light sensor. This depends on the battery's naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Stinger Plus DC is Canadian Standards Association (CSA) and Underwriter's Laboratory (UL) approved.

Operator's Manual

The operator's manual is good. It outlines safety considerations, installation, grounding, operations, and troubleshooting of the fence controller. Warranty information is not included in the operator's manual. It is recommended the manufacturer consider including warranty information and procedures for warranty claims in the operator's manual.

Warranty

The Stinger Plus DC has a two-year replacement warranty and a third year parts warranty.

The operator's manual does not indicate if controller damage caused by lightning is covered by the warranty. It is recommended the manufacturer consider including information on lightning damage coverage in the warranty section of the operator's manual.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Stockman Model 6000

Manufacturer and Distributor

Hallman Fence Systems Inc.
4 Terracon Place
Winnipeg, Manitoba R2J 4G7
(204) 233-7777
Website: www.hallman.mb.ca

Retail Outlets

Home Hardware, Peavey Mart, True Value, Federated Co-op

Retail Price

$169.74 (December 2000, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusion

Guard voltage output of the Stockman Model 6000 was 7,050 V for a clean fence condition and 2,320 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.8 A for a dry fence condition and 23.2 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 1.0 J respectively. A shock pulse was delivered every 0.9 seconds.

The Stockman Model 6000 is a 120 V AC unit intended for indoor use only. An indicator light is provided on the controller to indicate controller operation.

The Stockman Model 6000 has CSA approval. The operator's manual is fair. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including installation, operation, and troubleshooting tips.

The Manufacturer States that

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well, installation information is included in the fence controller carton.

Manufacturer's Additional Comments

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

The reader of this report should be aware that PAMI has chosen to report peak voltage and current with respect to ground rather than from the positive to negative peaks. We take issue with this aspect of the report as this procedure results in a significantly lower output than what we feel is produced.

General Description

The Stockman Model 6000 is a low impedance electric fence controller (**Figure 46**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

Figure 46. Stockman Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 47 and **48** show guard voltage outputs of the Stockman Model 6000 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 22** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

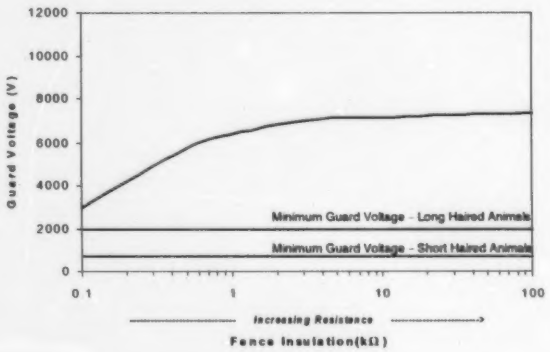

Figure 47. Guard Voltage for 3.3 mile (5.4 km) Fence.

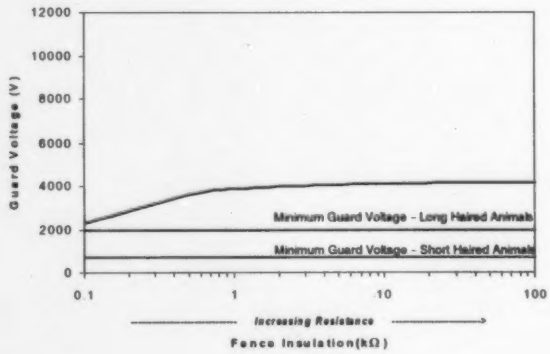

Figure 48. Guard Voltage for 10 mile (16 km) Fence.

Table 22. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,050 V
	Weeded Fence	2,960 V
10 mile	Clean Fence	4,040 V
	Weeded Fence	2,320 V

Stockman Model 6000

Manufacturer and Distributor

Hallman Fence Systems Inc.
4 Terracon Place
Winnipeg, Manitoba R2J 4G7
(204) 233-7777
Website: www.hallman.mb.ca

Retail Outlets

Home Hardware, Peavey Mart, True Value, Federated Co-op

Retail Price

$169.74 (December 2000, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusion

Guard voltage output of the Stockman Model 6000 was 7,060 V for a clean fence condition and 2,320 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.8 A for a dry fence condition and 23.2 A for a wet fence condition. Energy outputs at these conditions were 0.2 J and 1.0 J respectively. A shock pulse was delivered every 0.9 seconds.

The Stockman Model 6000 is a 120 V AC unit intended for indoor use only. An indicator light is provided on the controller to indicate controller operation.

The Stockman Model 6000 has CSA approval. The operator's manual is fair. No durability problems occurred.

Recommendations

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including installation, operation, and troubleshooting tips.

The Manufacturer States that

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well, installation information is included in the fence controller carton.

Manufacturer's Additional Comments

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

The reader of this report should be aware that PAMI has chosen to report peak voltage and current with respect to ground rather than from the positive to negative peaks. We take issue with this aspect of the report as this procedure results in a significantly lower output than what we feel is produced.

General Description

The Stockman Model 6000 is a low impedance electric fence controller (**Figure 46**). It is designed for 120 V AC operation. An indicator light is provided to indicate controller operation.

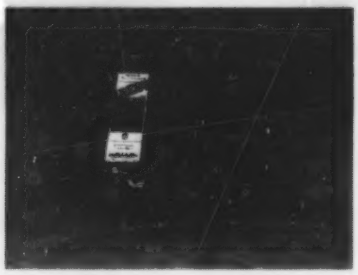

Figure 46. Stockman Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 47 and **48** show guard voltage outputs of the Stockman Model 6000 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 22** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

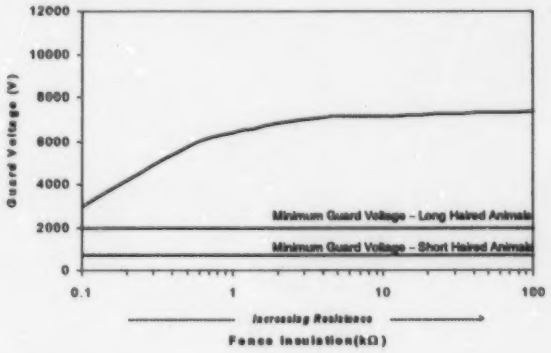

Figure 47. Guard Voltage for 3.3 mile (5.4 km) Fence.

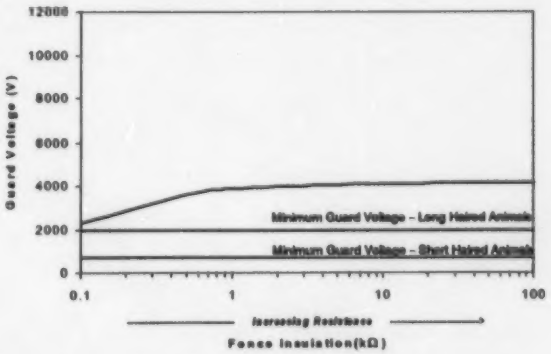

Figure 48. Guard Voltage for 10 mile (16 km) Fence.

Table 22. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,050 V
	Weeded Fence	2,980 V
10 mile	Clean Fence	4,040 V
	Weeded Fence	2,320 V

As can be seen from **Figures 47** and **48**, low resistance did not appreciably affect shock delivery since the voltage output was above 2,000 V for all fence conditions. The Stockman Model 6000 can be expected to deliver shock over a wide range of fence conditions.

The Stockman Model 6000 was unable to energize a fence at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence. The Stockman Model 6000 was able to energize a fence at -4°F (-20°C); the guard voltage output of the controller was 7,170 V, which is even higher than its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Stockman Model 6000 was suitable for winter operation down to -4°F (-20°C). The cold temperature test required for CSA approval is conducted at 0°F ± 4°F (-18°C ± 2°C) for which the Stockman Model 6000 would comply.

Shock Intensity: Current output for dry and wet conditions is shown in **Figures 49** and **50**.

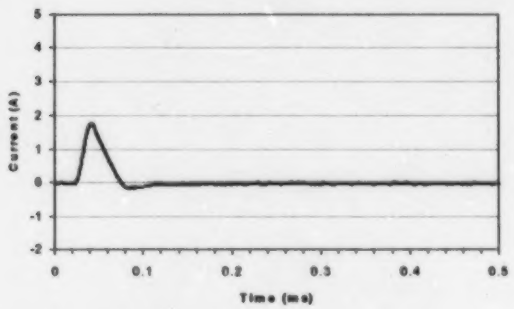

Figure 49. Dry Condition Current Output.

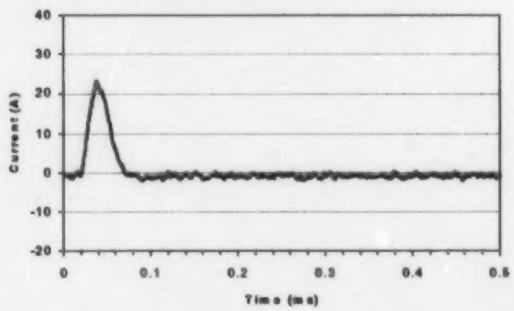

Figure 50. Wet Condition Current Output.

The peak current delivered by the Stockman Model 6000 and the corresponding energy output at these conditions are provided in **Table 23**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 23. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.9 A	0.2 J
	Wet	29.6 A	1.2 J
10 mile	Dry	1.0 A	0.1 J
	Wet	29.2 A	1.0 J

Shock Frequency: A shock pulse was delivered every 0.9 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 31 to 76 microseconds.

Ease of Operation

Installation: The Stockman Model 6000 is equipped with a three-wire grounded cord and attachment plug for connection to a standard, grounded 120 V AC receptacle. The controller's enclosure is plastic. The manufacturer recommends installing the controller indoors in a dry area and as close to the fence and ground rod as practical. The controller is not designed for outdoor installation and use.

The controller is equipped with ring terminal studs for connection to the fence and ground rod. For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Stockman Model 6000 is equipped with one indicator light for convenient troubleshooting of fence charging. A blinking power output indicator light indicates the controller is functioning and the fence is not shorted out. The light worked well and was easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's instructions are followed.

The Hallman Stockman Model 6000 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual is fair. It outlines procedures for grounding of the fence controller and the safety considerations associated with grounding. However, more information would have been helpful. It is recommended the manufacturer consider providing a more detailed operator's manual, including installation, operation, and troubleshooting information.

Warranty information and authorized service depot locations are also included as part of the controller's documentation package.

Warranty

The Stockman Model 6000 is warranted to be free from defects of material and workmanship for two years from the date of original purchase. Lightning damage is included in this warranty.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Gallagher M800

Manufacturer
Gallagher Group Ltd.
Private Bag 3026
181 Kahikatea Drive
Hamilton, New Zealand

Canadian Distributor
Gallagher Power Fencing Systems Inc.
P.O. Box 576
2090 20th Avenue East
Owen Sound, Ontario N4K 5R1
Website: www.gallagher.co.nz

Retail Outlets
Call 1-800-265-3150 to find a dealer near you.

Retail Price
$603.99 (May 2001, f.o.b. Humboldt, Saskatchewan)

Figure 51. Gallagher M800 Electric Fence Controller

Summary and Conclusions
Guard voltage output of the Gallagher M800 was 9,480 V for a clean fence condition and 2,920 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.4 A for a dry fence condition and 29.2 A for a wet fence condition. Energy outputs at these conditions were 1.2 J and 5.8 J respectively. A shock pulse was delivered every 1.1 seconds.

The Gallagher M800 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. Two indicator lights are provided on the controller to indicate controller operation and fence charging.

The Gallagher M800 has CSA approval. The operator's manual is excellent. No durability problems occurred.

Recommendations
No recommendations were required.

General Description
The Gallagher M800 is a low impedance electric fence controller (**Figure 51**). It is designed for 120 V AC operation.

Indicator lights are provided to indicate controller operation and fence charging. The controller is equipped with a full power output terminal and a reduced power output terminal for alternate output levels.

Results and Discussion
Quality of Work
Shock Delivery: Figures 52 and **53** show guard voltage outputs of the Gallagher M800 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 24** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

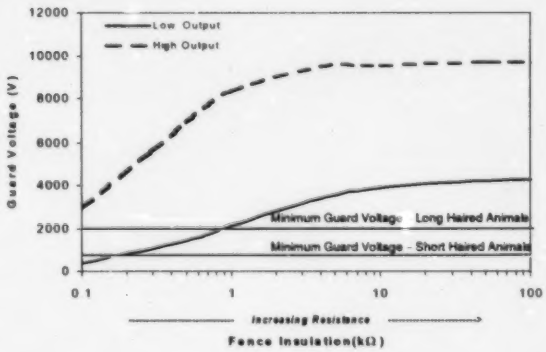

Figure 52. Guard Voltage for 3.3 mile (5.4 km) Fence

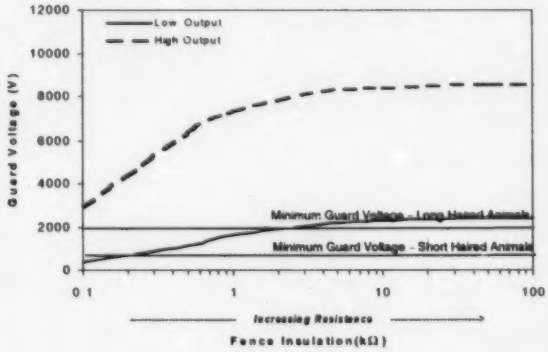

Figure 53. Guard Voltage for 10 mile (16 km) Fence

Table 24. Guard Voltage Data

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	9,480 V
	Weeded Fence	2,930 V
10 mile	Clean Fence	8,240 V
	Weeded Fence	2,920 V

Gallagher M800

Manufacturer
Gallagher Group Ltd.
Private Bag 3026
181 Kahikatea Drive
Hamilton, New Zealand

Canadian Distributor
Gallagher Power Fencing Systems Inc.
P.O. Box 576
2090 20th Avenue East
Owen Sound, Ontario N4K 5R1
Website: www.gallagher.co.nz

Retail Outlets
Call 1-800-265-3150 to find a dealer near you.

Retail Price
$603.99 (May 2001, f.o.b. Humboldt, Saskatchewan)

Summary and Conclusions
Guard voltage output of the Gallagher M800 was 9,480 V for a clean fence condition and 2,920 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.4 A for a dry fence condition and 29.2 A for a wet fence condition. Energy outputs at these conditions were 1.2 J and 5.8 J respectively. A shock pulse was delivered every 1.1 seconds.

The Gallagher M800 is a 120 V AC unit intended for mounting indoors or in an appropriate weatherproof shelter outdoors. Two indicator lights are provided on the controller to indicate controller operation and fence charging.

The Gallagher M800 has CSA approval. The operator's manual is excellent. No durability problems occurred.

Recommendations
No recommendations were required.

General Description
The Gallagher M800 is a low impedance electric fence controller (**Figure 51**). It is designed for 120 V AC operation.

Indicator lights are provided to indicate controller operation and fence charging. The controller is equipped with a full power output terminal and a reduced power output terminal for alternate output levels.

Figure 51. Gallagher M800 Electric Fence Controller.

Results and Discussion
Quality of Work
Shock Delivery: Figures 52 and **53** show guard voltage outputs of the Gallagher M800 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 24** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

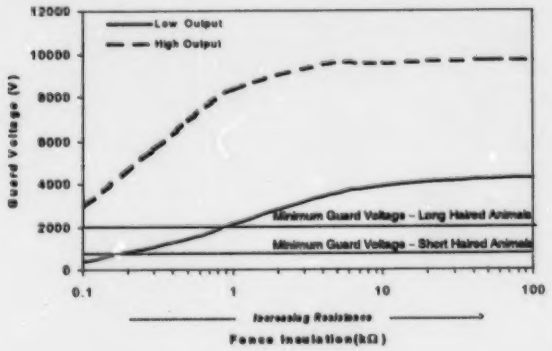

Figure 52. Guard Voltage for 3.3 mile (5.4 km) Fence.

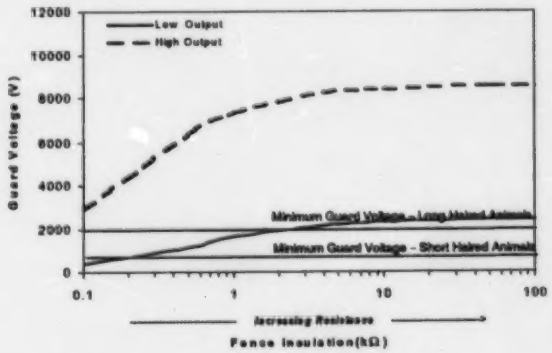

Figure 53. Guard Voltage for 10 mile (16 km) Fence.

Table 24. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	9,480 V
	Weeded Fence	2,920 V
10 mile	Clean Fence	8,240 V
	Weeded Fence	2,920 V

As can be seen from **Figures 52** and **53**, resistance did not appreciably affect shock delivery with the high output setting, since the voltage output was above 2,000 V for all fence conditions. Resistance did affect shock delivery with the low output setting, since the voltage output was below 2,000 V and 700 V for some fence conditions. The Gallagher M800 can be expected to deliver shock over a wide range of fence conditions on the high output setting.

The Gallagher M800 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 9,940 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Gallagher M800 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in **Figures 54** and **55**.

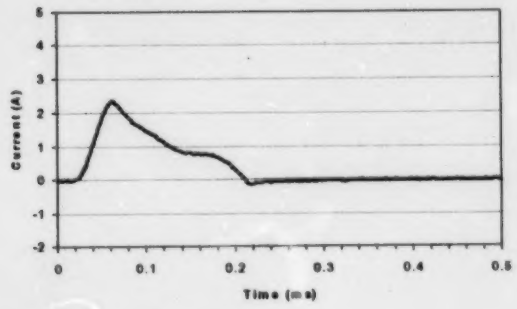

Figure 54. Dry Condition Current Output.

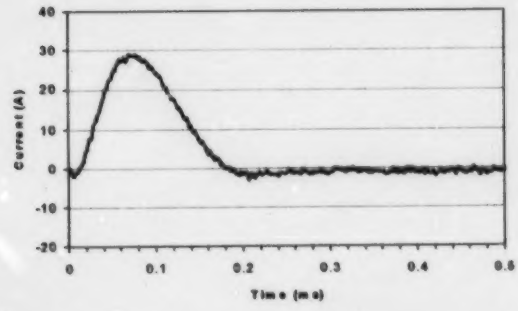

Figure 55. Wet Condition Current Output.

The peak current delivered by the Gallagher M800 and the corresponding energy output at these conditions is provided in **Table 25**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 25. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	2.4 A	1.2 J
	Wet	29.3 A	6.0 J
10 mile	Dry	2.1 A	1.3 J
	Wet	29.2 A	5.8 J

Shock Frequency: A shock pulse was delivered every 1.1 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 149 to 229 microseconds.

Ease of Operation

Installation: The Gallagher M800 is equipped with a three-wire grounded cord and attachment plug for connection to a standard, grounded 120 V AC receptacle. The controller's enclosure is plastic. The controller is intended to be mounted in a location that is sheltered from the weather, either in a dry area indoors or in an appropriate weatherproof shelter outdoors. The manufacturer recommends installation in a dry area near an electrical receptacle and accessible to separate ground rods.

The controller is equipped with ring terminal studs for connection to the fence and ground rods. Two fence connection terminals are provided: a full power terminal and a reduced power terminal. The reduced power terminal can be connected to short or clean fences where full power may not be required. In addition, two different fence systems can be simultaneously operated with the full and reduced power terminals by connecting one fence system to the full power terminal, and the other fence system to the reduced power terminal of the controller.

For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Gallagher M800 is equipped with two indicator lights for convenient troubleshooting of controller operation and fence charging. The controller indicator light flashes when the controller is working satisfactorily. The fence indicator light flashes with each pulse to indicate fence condition. It will either flash intermittently or not at all if the fence is overloaded, which can occur if excessive vegetation is in contact with the fence. Fence condition is not monitored when using the reduced power terminal so the fence indicator light will flash continually. The lights worked well and were easy to see under normal indoor lighting conditions.

Operator Safety

No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Gallagher M800 is Canadian Standards Association (CSA) approved.

Operator's Manual

The operator's manual is excellent. It outlines safety considerations, installation, grounding, and operation of the fence controller. An electric fence manual, which includes operating and troubleshooting tips, and a warranty registration card are also included as part of the controller's documentation package.

Warranty

In Canada the Gallagher M800 is warranted against failure for two years from the date of original purchase. Lightning damage is included in this warranty.

Mechanical History

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered in the 24 hours of testing.

Gallagher PowerBox B300

Manufacturer

Gallagher Group Ltd.
Private Bag 3026
181 Kahikatea Drive
Hamilton, New Zealand

Canadian Distributor

Gallagher Power Fencing Systems Inc.
P.O. Box 576
2090 20th Avenue East
Owen Sound, Ontario N4K 5R1
Website: www.gallagher.co.nz

Retail Outlets

Call 1-800-265-3150 to find a dealer near you.

Retail Price

$472.99 (May 2001, f.o.b. Humboldt, Saskatchewan)
PowerBox B300 Plus Solar Kit - $1,061.99

Summary and Conclusions

Guard voltage output of the Gallagher PowerBox B300 was 7,760 V for a clean fence condition and 1,970 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.9 A for a dry fence condition and 19.7 A for a wet fence condition. Energy outputs at these conditions were 0.5 J and 1.5 J respectively. A shock pulse was delivered every 1.2 seconds with the pulse control switch at the standard pulse position.

The Gallagher PowerBox B300 is a 12 V DC unit intended for outdoor use. Two indicator lights are provided on the controller to indicate fence charging and battery condition. The controller also has a three-position power switch for varying output voltage and a four-position pulse switch for varying the output pulse rate. A 70 amp-hour battery would last about 2.0 weeks with the power switch at the full power position and the pulse switch at the standard pulse position.

The Gallagher PowerBox B300 does not have CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

No recommendations were required.

General Description

The Gallagher PowerBox B300 is a low impedance electric fence controller (**Figure 56**). It is designed for 12 V DC operation. Indicator lights are provided to indicate fence and battery condition. The controller also comes equipped with power and pulse option switches for varying pulse output and rate.

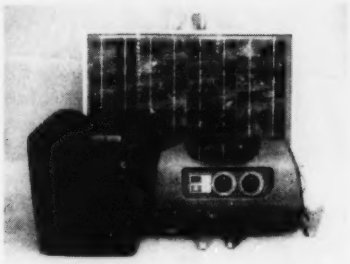

Figure 56. Gallagher PowerBox B300 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 57 and **58** show guard voltage outputs of the Gallagher PowerBox B300 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 26** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

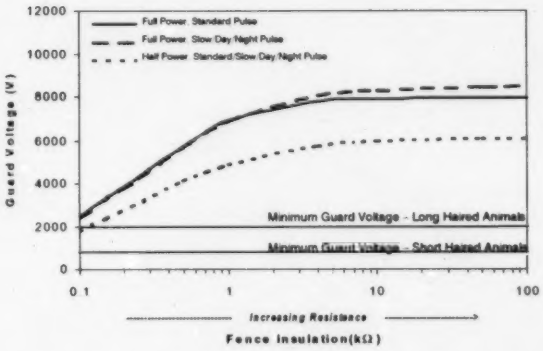

Figure 57. Guard Voltage for 3.3 mile (5.4 km) Fence.

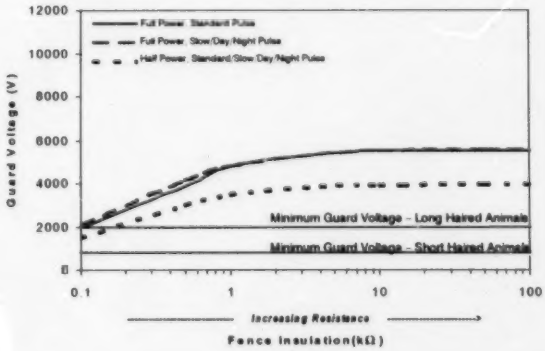

Figure 58. Guard Voltage for 10 mile (16 km) Fence.

Table 26. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,760 V
	Weeded Fence	2,480 V
10 mile	Clean Fence	5,370 V
	Weeded Fence	1,970 V

Gallagher PowerBox B300

Manufacturer

Gallagher Group Ltd.
Private Bag 3026
181 Kahikatea Drive
Hamilton, New Zealand

Canadian Distributor

Gallagher Power Fencing Systems Inc.
P.O. Box 576
2090 20th Avenue East
Owen Sound, Ontario N4K 5R1
Website: www.gallagher.co.nz

Retail Outlets

Call 1-800-265-3150 to find a dealer near you.

Retail Price

$472.99 (May 2001, f.o.b. Humboldt, Saskatchewan)
PowerBox B300 Plus Solar Kit - $1,061.99

Summary and Conclusions

Guard voltage output of the Gallagher PowerBox B300 was 7,760 V for a clean fence condition and 1,970 V for a weeded fence condition. The output was above the 2,000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.9 A for a dry fence condition and 19.7 A for a wet fence condition. Energy outputs at these conditions were 0.5 J and 1.5 J respectively. A shock pulse was delivered every 1.2 seconds with the pulse control switch at the standard pulse position.

The Gallagher PowerBox B300 is a 12 V DC unit intended for outdoor use. Two indicator lights are provided on the controller to indicate fence charging and battery condition. The controller also has a three-position power switch for varying output voltage and a four-position pulse switch for varying the output pulse rate. A 70 amp-hour battery would last about 2.0 weeks with the power switch at the full power position and the pulse switch at the standard pulse position.

The Gallagher PowerBox B300 does not have CSA approval. The operator's manual is very good. No durability problems occurred.

Recommendations

No recommendations were required.

General Description

The Gallagher PowerBox B300 is a low impedance electric fence controller (**Figure 56**). It is designed for 12 V DC operation. Indicator lights are provided to indicate fence and battery condition. The controller also comes equipped with power and pulse option switches for varying pulse output and rate.

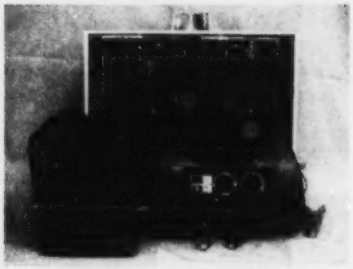

Figure 56. Gallagher PowerBox B300 Electric Fence Controller.

Results and Discussion

Quality of Work

Shock Delivery: Figures 57 and **58** show guard voltage outputs of the Gallagher PowerBox B300 for 3.3 and 10 mile (5.4 and 16 km) lengths of single wire fence over a range of resistances. **Table 26** provides the guard voltages at the "weeded" and "clean" fence conditions. Guard voltage values for other fence conditions are given in **Appendix II**. The higher the guard voltage the higher the shock delivered to the animal.

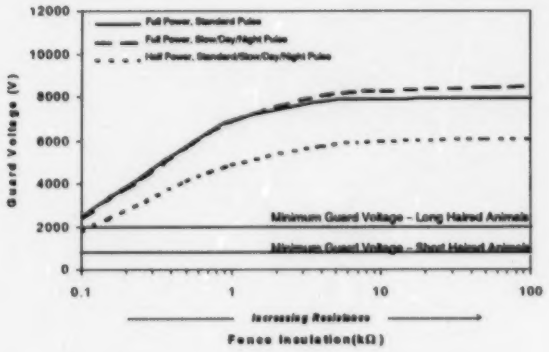

Figure 57. Guard Voltage for 3.3 mile (5.4 km) Fence

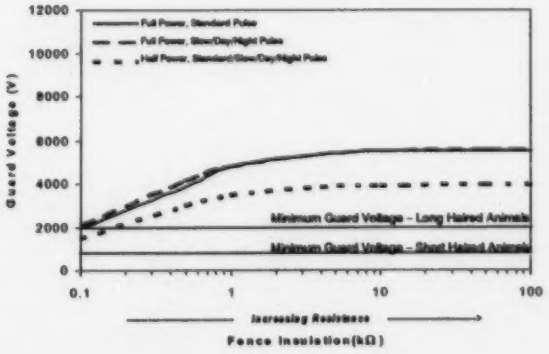

Figure 58. Guard Voltage for 10 mile (16 km) Fence.

Table 26. Guard Voltage Data.

Fence Length	Fence Condition	Guard Voltage
3.3 mile	Clean Fence	7,760 V
	Weeded Fence	2,460 V
10 mile	Clean Fence	5,370 V
	Weeded Fence	1,970 V

As can be seen from **Figures 57** and **58**, low resistance did not appreciably affect shock delivery, since the voltage output was above 2,000 V for nearly all fence conditions and above the 700 V minimum guard voltage for all fence conditions. The Gallagher PowerBox B300 can be expected to deliver shock over a wide range of fence conditions.

The Gallagher PowerBox B300 could effectively be used to energize a fence during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mile (5.4 km) single wire fence was about 8,135 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2,000 V minimum required to overcome the insulation resistance of long-haired animals, the Gallagher PowerBox B300 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in **Figures 59** and **60**.

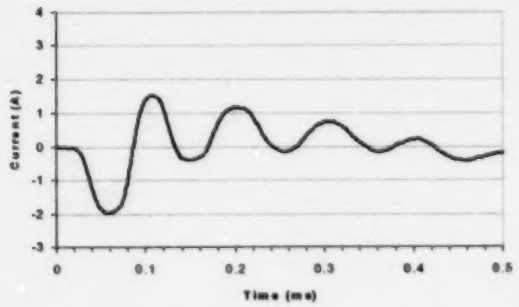

Figure 59. Dry Condition Current Output.

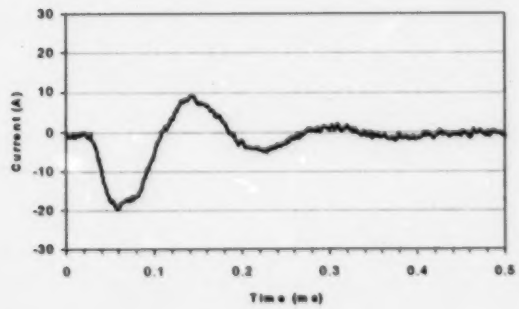

Figure 60. Wet Condition Current Output.

The peak current delivered by the Gallagher PowerBox B300 and the corresponding energy output at these conditions is provided in **Table 27**. Energy and current outputs for other fence conditions are given in **Appendix II**. The values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a portion of the total output as determined by the operating conditions.

Table 27. Shock Intensity Data.

Fence Length	Operating Condition	Peak Current	Energy
3.3 mile	Dry	1.9 A	0.5 J
	Wet	24.8 A	2.0 J
10 mile	Dry	1.3 A	1.0 J
	Wet	19.7 A	1.5 J

Shock Frequency: A shock pulse was delivered every 1.2 seconds on all control settings except for the slow setting which delivered a shock pulse every 2.5 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 57 to 86 microseconds.

Ease of Operation

Installation: The Gallagher PowerBox B300 was equipped with wire leads and clamps for connection to a standard 12 V automotive battery. Lead wires and clamps for connecting the controller to the fence wire and ground rod are also provided. The controller's enclosure is plastic and consists of two separate sections. The top section contains the electronics and controls, while the bottom section serves as the battery storage case. When the top and bottom sections are secured together, the entire enclosure is fully weatherproof.

For our testing purposes, the controller was connected to the fence simulation circuit with a length of insulated wire.

Indicators: The Gallagher PowerBox B300 is equipped with two indicator lights for convenient troubleshooting of fence charging and battery condition. The fence indicator light flashes with each pulse when the voltage is large enough to provide an effective shock. A battery status light indicates battery condition. The light will operate in one of four different display modes depending on the charge condition of the battery. The lights worked well and were easy to see under normal indoor lighting conditions.

Battery Consumption: The controller is equipped with power and pulse operating controls for extending the battery's life and reducing the voltage on short or clean fences. The power control options include off, half-power, and full power positions. The pulse control options include a standard pulse position (controller operates at approximately one pulse every second), slow pulse position (approximately 3 seconds between pulses), sun/daylight pulse position (for animals active during the daylight; pulse rate is automatically reduced at night to approximately 3 seconds), and moon/night position (for animals active at night; pulse rate during the day is automatically reduced).

For a given power and pulse operational setting, a 12V, 70 amp-hour battery will operate the Gallagher PowerBox B300 for the time period indicated in **Table 28**. The consumption did increase as load on the controller increased.

Table 28. Gallagher PowerBox B300 Battery Life.

Power Control Position	Pulse Control Position	Battery Life
Full Power	Standard Pulse	2.0 weeks
Half-Power	Standard Pulse	3.8 weeks
Full Power	Slow Pulse	3.6 weeks
Half-Power	Slow Pulse	7.9 weeks
Full Power	Day/Sun or Night/Moon	1.9 weeks
Half-Power	Day/Sun or Night/Moon	3.8 weeks

When utilizing the solar panel kit in connection with a 70 amp-hour battery in the Canadian prairies at the full standard setting, the battery should be checked every month during summer months and weekly during winter months to determine whether charging is necessary. Battery life in connection with a solar panel may be affected by temperature, angle of the sun, angle of the solar panel, cloud cover, energizer settings, and other energizer conditions; therefore, to ensure adequate battery life, caution is advised when initially operating an energizer and solar panel without long-term supervision.

Operator Safety
No safety problems were evident if the manufacturer's safety warnings, installation instructions, and operating instructions are followed.

The Gallagher PowerBox B300 is not Canadian Standards Association (CSA) approved.

Operator's Manual
The operator's manual is very good. It outlines safety considerations, installation, grounding, operation, and troubleshooting of the fence controller. Warranty information is also included in the operator's manual.

Warranty
The Gallagher PowerBox B300 is warranted against failure for two years from the date of original purchase. Lightning damage is not included in this warranty. The controller also comes with a 30 day money-back guarantee

Mechanical History
The intent of the test was evaluation of functional performance. An extended durability test was not performed.

No mechanical problems were encountered during the 24 hours of testing.

Appendix I – PAMI Ratings

The following rating scale is used in PAMI reports.

- Excellent
- Very Good
- Good
- Fair
- Poor
- Unsatisfactory

Appendix II – Shock Intensity and Guard Voltage Data

Baygard 1500

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,100	31.00	1.17	26.50
0.5	5,684	11.37	0.89	34.17
1.0	6,276	6.28	0.60	35.67
4.0	6,836	1.71	0.19	36.17
10.0	6,942	0.69	0.06	36.00
50.0	6,943	0.14	0.02	36.33
200.0	6,998	0.03	0.00	36.17

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,403	24.03	0.98	39.17
0.5	3,577	7.15	0.61	60.50
1.0	3,779	3.78	0.38	60.33
4.0	3,956	0.99	0.11	60.17
10.0	4,021	0.40	0.05	59.50
50.0	4,011	0.08	0.01	59.67
200.0	3,985	0.02	0.00	59.50

BULLDOZER Model C402

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,523	25.23	1.47	50.33
0.5	5,452	10.90	1.39	58.67
1.0	6,369	6.39	0.98	74.67
4.0	7,084	1.77	0.34	103.00
10.0	7,231	0.72	0.14	105.17
50.0	7,341	0.15	0.03	103.50
200.0	7,278	0.04	0.01	105.83

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,209	22.09	1.26	57.50
0.5	3,829	7.66	1.00	96.83
1.0	4,271	4.27	0.71	118.17
4.0	4,563	1.14	0.23	125.50
10.0	4,569	0.46	0.10	125.50
50.0	4,657	0.09	0.02	125.17
200.0	4,650	0.02	0.01	124.33

Baygard 2000

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,969	29.69	0.98	24.33
0.5	5,330	10.66	0.73	32.50
1.0	5,963	5.96	0.50	35.00
4.0	6,406	1.60	0.16	36.00
10.0	6,529	0.65	0.07	36.33
50.0	6,546	0.13	0.01	35.83
200.0	6,586	0.03	0.00	35.83

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,182	21.82	0.77	39.00
0.5	3,221	6.44	0.49	60.17
1.0	3,447	3.45	0.31	60.50
4.0	3,565	0.89	0.09	60.50
10.0	3,584	0.36	0.04	60.67
50.0	3,629	0.07	0.01	60.67
200.0	3,762	0.02	0.00	60.00

Gallagher M800

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,930	29.34	5.99	149.3
0.5	6,900	13.79	5.80	195.8
1.0	8,330	8.33	3.89	181.2
4.0	9,480	2.37	1.19	173.3
10.0	9,580	0.96	0.48	172.8
50.0	9,690	0.19	0.10	172.7
200.0	9,630	0.05	0.03	171.7

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,920	29.22	5.81	148.8
0.5	6,370	12.74	5.53	229.5
1.0	7,290	7.29	3.84	170.8
4.0	8,240	2.06	1.31	156.0
10.0	8,400	0.84	0.55	154.0
50.0	8,530	0.17	0.11	153.6
200.0	8,490	0.04	0.03	154.2

Gallagher PowerBox B300

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,476	24.76	1.96	71.50
0.5	5,769	11.54	2.26	61.83
1.0	6,661	6.66	1.64	60.33
4.0	7,765	1.94	0.51	57.67
10.0	7,917	0.79	0.21	58.00
50.0	7,956	0.16	0.04	57.67
200.0	7,894	0.04	0.01	58.00

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	1,970	19.70	1.50	76.17
0.5	3,879	7.76	1.35	86.00
1.0	4,839	4.84	1.04	86.33
4.0	5,374	1.34	0.32	83.83
10.0	5,521	0.55	0.13	83.33
50.0	5,547	0.11	0.03	83.17
200.0	5,595	0.03	0.01	82.67

Red Snap'r LI30

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,902	39.02	2.54	34.83
0.5	7,448	14.90	1.78	34.50
1.0	8,186	8.19	1.11	37.83
4.0	8,961	2.24	0.36	41.17
10.0	9,141	0.91	0.15	42.33
50.0	9,261	0.19	0.03	42.50
200.0	7,376	0.04	0.01	74.17

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,269	32.69	2.12	41.00
0.5	5,181	10.36	1.27	56.83
1.0	5,578	5.58	0.79	61.50
4.0	5,867	1.47	0.24	66.33
10.0	5,910	0.59	0.10	67.00
50.0	5,964	0.12	0.02	67.50
200.0	5,979	0.03	0.01	67.30

PEL 230

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,814	38.14	3.22	58.33
0.5	7,190	14.38	2.46	102.00
1.0	8,052	8.05	1.64	108.33
4.0	8,777	2.19	0.53	112.00
10.0	9,033	0.90	0.23	109.33
50.0	9,114	0.18	0.05	107.67
200.0	9,130	0.05	0.01	108.17

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,412	34.12	2.87	59.33
0.5	5,339	10.68	1.90	119.17
1.0	5,663	5.66	1.19	126.83
4.0	6,019	1.50	0.37	132.00
10.0	6,113	0.61	0.18	132.00
50.0	6,145	0.12	0.03	133.17
200.0	6,125	0.03	0.01	133.00

Red Snap'r LIB30

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.05 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	1,909	19.09	0.96	70.50
0.5	4,875	9.75	1.17	53.67
1.0	5,876	5.88	0.91	61.00
4.0	6,889	1.72	0.36	70.17
10.0	7,243	0.72	0.16	72.50
50.0	7,414	0.15	0.04	74.00
200.0	7,376	0.04	0.01	74.17

Fence Length: 10 mile (16 km) – Capacitance: 0.15 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	1,631	16.31	0.67	78.50
0.5	3,191	6.38	0.80	93.00
1.0	3,623	3.62	0.57	104.67
4.0	3,976	0.99	0.20	118.00
10.0	4,090	0.41	0.09	120.17
50.0	4,100	0.08	0.02	121.50
200.0	4,101	0.02	0.00	121.67

Staffix M3.2

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.06 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,940	29.40	3.41	93.17
0.5	7,593	15.19	3.89	73.33
1.0	9,171	9.17	2.78	69.33
4.0	10,708	2.68	0.88	67.67
10.0	10,958	1.10	0.37	67.83
50.0	10,988	0.22	0.07	68.00
200.0	11,046	0.06	0.02	68.33

Fence Length: 10 mile (16 km) – Capacitance: 0.18 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,748	27.48	3.10	96.17
0.5	5,728	11.46	2.82	91.50
1.0	6,464	6.46	1.86	93.67
4.0	7,224	1.81	0.59	96.33
10.0	7,314	0.73	0.25	97.00
50.0	7,441	0.15	0.06	96.50
200.0	7,506	0.04	0.01	97.33

Stinger Plus DC

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.06 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,710	37.09	1.99	29.33
0.5	7,130	14.25	1.48	31.50
1.0	7,920	7.92	0.94	32.33
4.0	8,751	2.19	0.29	32.17
10.0	8,910	0.89	0.12	32.33
50.0	8,950	0.18	0.02	32.17
200.0	9,040	0.05	0.01	32.00

Fence Length: 10 mile (16 km) – Capacitance: 0.18 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,020	30.23	1.54	36.17
0.5	4,680	9.35	0.91	48.67
1.0	5,010	5.01	0.55	50.83
4.0	5,310	1.33	0.16	50.83
10.0	5,300	0.53	0.07	51.17
50.0	5,340	0.11	0.01	51.17
200.0	5,400	0.03	0.00	51.17

Stinger Plus AC

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.06 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,999	39.99	2.09	26.67
0.5	7,366	14.73	1.46	31.67
1.0	8,128	8.13	0.93	32.50
4.0	8,823	2.21	0.29	32.83
10.0	9,003	0.90	0.12	32.67
50.0	9,062	0.18	0.02	32.67
200.0	9,144	0.05	0.01	33.00

Fence Length: 10 mile (16 km) – Capacitance: 0.18 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	3,209	32.09	1.57	33.67
0.5	4,897	9.79	0.93	50.00
1.0	5,280	5.28	0.57	51.50
4.0	5,526	1.38	0.17	52.17
10.0	5,610	0.56	0.07	52.67
50.0	5,585	0.11	0.01	53.17
200.0	5,582	0.03	0.00	52.83

Stockman Model 6000

Fence Length: 3.3 mile (5.4 km) – Capacitance: 0.06 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,955	29.55	4.72	30.67
0.5	5,737	11.47	3.97	36.67
1.0	6,389	6.39	2.68	41.50
4.0	7,048	1.76	0.90	43.67
10.0	7,124	0.71	0.38	44.17
50.0	7,279	0.15	0.08	43.67
200.0	7,329	0.04	0.02	43.83

Fence Length: 10 mile (16 km) – Capacitance: 0.18 µF				
Resistance (kΩ)	Peak Voltage (V)	Current (A)	Energy (J)	Pulse Duration (µs)
0.1	2,324	23.24	3.91	40.83
0.5	3,628	7.26	2.71	73.00
1.0	3,876	3.88	1.76	76.17
4.0	4,036	1.01	0.54	75.67
10.0	4,110	0.41	0.22	74.83
50.0	4,137	0.08	0.05	75.17
200.0	4,122	0.02	0.01	74.33

Appendix III – Specifications

Make:	Baygard
Model:	1500
Serial Number:	46593
Type:	Low Impedance
Power Requirements:	12 V DC Battery Operated
Weight:	2.67 lb (1.21 kg)
Overall Dimensions:	
> width	4.5 in (114 mm)
> depth	3.1 in (78 mm)
> height	9.4 in (238 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	No
Output Terminals:	Binding Post
Type of Enclosure:	Plastic; manufactured for outdoor use, but weatherproof installation recommended
Warranty:	2 year (1 year outside Canada); includes lightning damage

Make:	BULLDOZER
Model:	Model C402
Serial Number:	000307000037
Type:	Low Impedance
Power Requirements:	105-125 V AC
Weight:	3.32 lb (1.51 kg)
Overall Dimensions:	
> width	6.0 in (152 mm)
> depth	4.5 in (114 mm) (including output terminals)
> height	8.5 in (216 mm)
Number of Indicator Lights:	1 (fence charging)
Output Selection:	No
Output Terminals:	Ring Terminal Connector
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	30 day full warranty, 1 year limited warranty; includes lightning damage

Make:	Baygard
Model:	2000
Serial Number:	46492
Type:	Low Impedance
Power Requirements:	120 V AC
Weight:	2.72 lb (1.23 kg)
Overall Dimensions:	
> width	4.5 in (114 mm)
> depth	3.1 in (78 mm)
> height	9.4 in (238 mm)
Number of Indicator Lights:	None
Output Selection:	No
Output Terminals:	Binding Post
Type of Enclosure:	Plastic; indoor use only
Warranty:	2 year (1 year outside Canada); includes lightning damage

Make:	Gallagher
Model:	M800
Serial Number:	0102500194
Type:	Low Impedance
Power Requirements:	110-120 V AC
Weight:	6.29 lb (2.85 kg)
Overall Dimensions:	
> width	8.9 in (227 mm)
> depth	5.2 in (132 mm)
> height	8.7 in (220 mm)
Number of Indicator Lights:	2 (controller operation and fence charging)
Output Selection:	Full power and reduced power output terminals
Output Terminals:	Ring Terminal Connector
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	2 year; includes lightning damage

Make:	Gallagher
Model:	PowerBox B300
Serial Number:	01018315016
Type:	Low Impedance
Power Requirements:	12 V DC
Weight:	7.44 lb (3.37 kg)
Overall Dimensions:	
> width	13.7 in (347 mm)
> depth	9.1 in (232 mm)
> height	15.4 in (391 mm)
Number of Indicator Lights:	2 (fence changing and battery condition)
Output Selection:	Power and pulse option switcher
Output Terminals:	Binding Post
Type of Enclosure:	Plastic; for outdoor use
Warranty:	2 year; does not include lightning damage

Make:	Red Snap'r
Model:	LI30
Serial Number:	3007001320 and 13003015920
Type:	Low Impedance
Power Requirements:	110 V AC
Weight:	3.44 lb (1.56 kg)
Overall Dimensions:	
> width	5.1 in (130 mm)
> depth	3.8 in (95 mm)
> height	11.0 in (279 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	No
Output Terminals:	Binding Post
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	1 year; includes lightning damage

Make:	PEL
Model:	Power Pulse PEL 230
Serial Number:	8110
Type:	Low Impedance
Power Requirements:	110-120 V AC
Weight:	3.12 lb (1.41 kg)
Overall Dimensions:	
> width	7.3 in (186 mm)
> depth	2.8 in (70 mm)
> height	10.3 in (260 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	No
Output Terminals:	Ring Terminal Connector
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	2 year; does not include lightning damage. Installation instructions recommend PEL PA68 Lightning Protection Kit.

Make:	Red Snap'r
Model:	LIB30
Serial Number:	83008970005
Type:	Low Impedance
Power Requirements:	12 V DC Battery Operated
Weight:	3.86 lb (1.75 kg)
Overall Dimensions:	
> width	5.1 in (130 mm)
> depth	3.8 in (95 mm)
> height	11.0 in (279 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	Normal-Low Voltage Output Switch
Output Terminals:	Binding Post Terminal
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	1 year; includes lightning damage

Make:	Stafix
Model:	M3.2
Serial Number:	412541 NZ
Type:	Low Impedance
Power Requirements:	110-120 V AC
Weight:	2.90 lb (1.36 kg)
Overall Dimensions:	
> width	10.3 in (262 mm)
> depth	2.6 in (67 mm)
> height	6.0 in (152 mm)
Number of Indicator Lights:	2 (power supply and controller operation)
Output Selection:	Full power and reduced power output terminals
Output Terminals:	Ring Terminal Connector
Type of Enclosure:	Plastic; indoor or weatherproof protective enclosure installation only
Warranty:	2 year; includes lightning damage

Make:	Stinger Plus DC
Model:	SPD-9601
Serial Number:	04213-0900
Type:	Low Impedance
Power Requirements:	12 V DC Battery Operated
Weight:	3.0 lb (1.36 kg)
Overall Dimensions:	
> width	5.3 in (133 mm)
> depth	3.5 in (89 mm)
> height	9.4 in (240 mm)
Number of Indicator Lights:	2 (controller operation)
Output Selection:	Light sensor reduces pulse rate and current draw at night
Output Terminals:	Binding Post
Type of Enclosure:	Plastic (UV and water resistant); for outdoor use
Warranty:	3 year (2 year replacement, 3rd year parts only)

Make:	Stinger Plus AC
Model:	SPD-9600
Serial Number:	04084-0700
Type:	Low Impedance
Power Requirements:	110-120 V AC
Weight:	3.13 lb (1.42 kg)
Overall Dimensions:	
> width	5.3 in (133 mm)
> depth	3.5 in (89 mm)
> height	9.4 in (240 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	No
Output Terminals:	Binding Post
Type of Enclosure:	Plastic; for outdoor use
Warranty:	3 year (2 year replacement, 3rd year parts only)

Make:	Stockman
Model:	Model 6000
Serial Number:	F34937
Type:	Low Impedance
Power Requirements:	120 V AC
Weight:	3,84 lb (1.74 kg)
Overall Dimensions:	
> width	9.3 in (235 mm)
> depth	4.1 in (103 mm)
> height	7.2 in (183 mm)
Number of Indicator Lights:	1 (controller operation)
Output Selection:	No
Output Terminals:	Ring Terminal Connector
Type of Enclosure:	Plastic; indoor recommended
Warranty:	2 year; includes lightning damage

Appendix IV – Summary Chart

Baygard 1500

Retail Price:	$250.00 (December 2000, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	6,840 V
> Weeded Fence	2,400 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.7 A
> Wet Condition	24.0 A
- Energy	
> Dry Condition	0.2 J
> Wet Condition	1.0 J
Shock Frequency:	Shock pulse every 1.2 seconds
Ease of Operation:	
Installation:	12 V DC; mount indoors or appropriate outdoor weatherproof shelter
Indicators:	One flashing light; indicates controller operation
Battery Consumption:	70 amp-hour battery lasts 4.1 weeks
Operator Safety:	UL listed
Operator's Manual:	Very good; contained useful information
Mechanical History:	No problems encountered

BULLDOZER Model C402

Retail Price:	$189.99 (June 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	7,080 V
> Weeded Fence	2,210 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.8 A
> Wet Condition	22.1 A
- Energy	
> Dry Condition	0.3 J
> Wet Condition	1.3 J
Shock Frequency:	Shock pulse every 1.1 seconds
Ease of Operation:	
Installation:	120 V AC, two prong polarized receptacle; mount in a sheltered location
Indicators:	One flashing light; indicates fence condition
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Very good
Mechanical History:	No problems encountered

Baygard 2000

Retail Price:	$119.00 (December 2000, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	6,810 V
> Weeded Fence	2,160 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.6 A
> Wet Condition	21.9 A
- Energy	
> Dry Condition	0.2 J
> Wet Condition	1.2 J
Shock Frequency:	Shock pulse every 1.2 seconds
Ease of Operation:	
Installation:	120 V AC, three prong receptacle; mount indoors
Indicators:	None
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Very good
Mechanical History:	No problems encountered

Gallagher M800

Retail Price:	$603.99 (May 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	9,480 V
> Weeded Fence	2,920 V
> Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.4 A
> Wet Condition	29.2 A
- Energy	
> Dry Condition	1.2 J
> Wet Condition	5.8 J
Shock Frequency:	Shock pulse every 1.1 seconds
Ease of Operation:	
Installation:	120 V AC, three prong receptacle; mount indoors or an appropriate weatherproof outdoor shelter; additional terminal available for reduced output
Indicators:	Two flashing lights; indicate fence condition and controller operation
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Excellent
Mechanical History:	No problems encountered

Gallagher PowerBox B300

Retail Price:	$472.99 (May 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	7,760 V
> Weeded Fence	1,970 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.9 A
> Wet Condition	19.7 A
- Energy	
> Dry Condition	0.5 J
> Wet Condition	1.5 J
Shock Frequency:	Shock pulse every 1.2 seconds at full power and standard pulse positions
Ease of Operation:	
Installation:	12 V DC; mount outdoors; three position switch for high/low/off output and four position switch to adjust pulse frequency
Indicators:	Two lights; indicate battery condition and controller operation
Battery Consumption:	70 amp-hour battery lasts from 2 weeks to a maximum of 7.9 weeks depending on user controls
Operator Safety:	Not CSA approved
Operator's Manual:	Very good
Mechanical History:	Not effective below 14°F (-10°C)

PEL 230

Retail Price:	$219.00 (January 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	8,780 V
> Weeded Fence	3,412 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.2 A
> Wet Condition	34.1 A
- Energy	
> Dry Condition	0.5 J
> Wet Condition	2.9 J
Shock Frequency:	Shock pulse every 1.2 seconds
Ease of Operation:	
Installation:	120 V AC, two prong polarized receptacle; mount indoors
Indicators:	One flashing light; indicates fence condition
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Good; contained useful information but more would have been helpful
Mechanical History:	No problems encountered

Red Snap'r LI30

Retail Price:	$150.00 (May 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	8,960 V
> Weeded Fence	3,290 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.2 A
> Wet Condition	32.9 A
- Energy	
> Dry Condition	0.4 J
> Wet Condition	2.1 J
Shock Frequency:	Shock pulse every 1.1 seconds
Ease of Operation:	
Installation:	120 V AC, two prong polarized receptacle; mount indoors or an appropriate outdoor weatherproof shelter
Indicators:	One flashing light; indicates fence condition
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Very good
Mechanical History:	No problems encountered

Red Snap'r LIB30

Retail Price:	$175.00 (May 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	6,860 V
> Weeded Fence	1,630 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.7 A
> Wet Condition	16.3 A
- Energy	
> Dry Condition	0.4 J
> Wet Condition	0.9 J
Shock Frequency:	Shock pulse every 1.6 seconds
Ease of Operation:	
Installation:	12 V DC; mount indoors or in an appropriate weatherproof shelter outdoors; two position for reduced output
Indicators:	One flashing light; indicates controller operation
Battery Consumption:	70 amp-hour battery lasts 2 weeks on normal and 4.1 weeks on battery saver
Operator Safety:	CSA approved
Operator's Manual:	Very good
Mechanical History:	Not effective below 14°F (-10°C)

Stafix M3.2

Retail Price:	$375.00 (January 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	10,710 V
> Weeded Fence	2,750 V
> Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.7 A
> Wet Condition	27.5 A
- Energy	
> Dry Condition	0.9 J
> Wet Condition	3.1 J
Shock Frequency:	Shock pulse every 1.2 seconds
Ease of Operation:	
Installation:	120 V AC, two prong polarized receptacle; mount indoors or an appropriate weatherproof outdoor shelter
Indicators:	Two lights; indicate power supply and controller operation
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Good; contained useful information but more would have been helpful
Mechanical History:	No problems encountered

Stinger Plus DC

Retail Price:	$229.00 (January 2001, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	8,750 V
> Weeded Fence	3,020 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.2 A
> Wet Condition	30.2 A
- Energy	
> Dry Condition	0.3 J
> Wet Condition	1.5 J
Shock Frequency:	Shock pulse every 3.2 seconds
Ease of Operation:	
Installation:	12 V DC; mount outdoors; photocell to reduce output
Indicators:	Two flashing lights; indicate fence and battery condition
Battery Consumption:	70 amp-hour battery lasts 2 weeks in light, 7 weeks in dark
Operator Safety:	CSA and UL approved
Operator's Manual:	Good; contained useful information but more would have been helpful
Mechanical History:	No problems encountered

Stinger Plus AC

Retail Price:	$219.99 (December 2000, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	8,820 V
> Weeded Fence	3,210 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	2.2 A
> Wet Condition	32.1 A
- Energy	
> Dry Condition	0.3 J
> Wet Condition	1.6 J
Shock Frequency:	Shock pulse every 1.1 seconds
Ease of Operation:	
Installation:	120 V AC, three prong receptacle; mount outdoors
Indicators:	One flashing light; indicates controller operation
Battery Consumption:	N/A
Operator Safety:	CSA and UL approved
Operator's Manual:	Good; contained useful information but more would have been helpful
Mechanical History:	No problems encountered

Stockman Model 6000

Retail Price:	$169.74 (December 2000, f.o.b. Humboldt, Saskatchewan)
Quality of Work:	
Shock Delivery:	
- Guard Voltage	
> Clean Fence	7,050 V
> Weeded Fence	2,320 V
> Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity:	
- Peak Current	
> Dry Condition	1.8 A
> Wet Condition	23.2 A
- Energy	
> Dry Condition	0.2 J
> Wet Condition	1.0 J
Shock Frequency:	Shock pulse every 0.9 seconds
Ease of Operation:	
Installation:	120 V AC, three prong receptacle; mount indoors
Indicators:	One flashing light; indicates fence condition
Battery Consumption:	N/A
Operator Safety:	CSA approved
Operator's Manual:	Fair; contained useful information but more would have been helpful
Mechanical History:	No problems encountered

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